Institute for Alternative Futures

The AMEDD Futures 2039 Project:

Phase 2 Final Report

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Explore. Aspire. Create. Evolve.

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AMEDD Futures 2039 Project Report

Thinking about the future is a key 21st century leadership skill. Leaders need to be able to identify emerging patterns in the external and internal environments, and lead their organizations through change. Missions are changing. Leaders should recognize potential future missions and develop the capabilities to achieve them ahead of time, rather than reacting to changes in the environment.

The Army Medical Department (AMEDD) has completed Phase 1 and Phase 2 of the AMEDD Futures 2039 Project, which explored many of the trends that will become increasingly significant to the missions, capabilities, and performance of the AMEDD. During Phase 1 of the project, participants discussed a set of 14 forecasts developed by the Institute for Alternative Futures (IAF) for the year 2039. Following, Phase 2 taught participants to conduct an environmental scan and create provocative forecasts regarding the following topics Phase 1 participants identified as important:

- Military Medicine 2039 – Jointness and Beyond
- The 2039 Health Care Model
- Healthy Communities in 2039
- The Optimization of Health is Achieved through Science and Technology
- Professional Staff and Professional Roles in 2039
- The Power of Military Medicine for Geo-Political Aims

Participants were divided into six "virtual working groups" (VWGs), each of which was led by a Senior Futurist Facilitator provided by IAF. Each VWG collaborated online and through teleconferences to scan recent trends and developments in their assigned topic area, create plausible and provocative forecasts for how that area could develop between now and 2039. From the forecasts, participants formulated specific actions the AMEDD should take today to prepare for those changes. Participants met for a one-day off-site in Arlington, VA to share their findings with the other groups, receive feedback on their work, and present their recommendations to project champion Brigadier General Tim Adams. After the incorporation of feedback from BG Adams and the rest of the groups, the VWGs later presented their findings and recommendations to the Surgeon General and other AMEDD leaders.

The six VWGs foresaw similar worlds in 2039, forecasting that we will live in a highly globalized and urbanized world, where the U.S. will not be the dominant political entity. Humanitarian crises, pandemics and resource shortages will ensure that public health issues present the greatest challenge - and the greatest opportunity for the AMEDD to make a profound contribution. As traditional war-fighting will largely give way to broader military missions, the role of military medicine will grow from one of caring for soldiers and families to providing health care to local populations in foreign countries and to training health professionals in the local public health systems. As preparation for this larger role, the AMEDD will add "cultural skills" to its world-renowned medical skills and its electronic database of health outcomes. In its larger role the AMEDD will help build a "medical bridge to peace" – which will win allies to the U.S. side through its support of global public health.

The forces of technological advancement and preventive medicine will fundamentally change health care. Nanotech, biotech, robotics, regeneration, stem cell therapies, biosensors (implanted and

remote) and other technologies will provide effective therapies for many diseases. Self-care and prevention will become replace expensive medical interventions. These two trends will combine in the expansion of telemedicine and in the development of what one group called "functional decision-making capacity" in health – an avatar-based system for personal health coaching and medical evidence collection that will grow out of electronic medical records (EMRs). This avatar technology will remake the medical education system, providing customized training for medical professionals throughout their careers.

Also common to all of the papers was a high level of aspiration for the AMEDD's role in this changing world. Many of the papers presented AMEDD as a principal component of America's appeal abroad. It is clear that participants take great pride in the AMEDD and anticipate playing an even greater role as America's future health ambassadors to the world.

Phase 2 proved that the AMEDD has in its officer corps a number of very good forecasters who can study the leading edges of change and see possibilities for the AMEDD that include the promise of greatness – a great future for the AMEDD, the military, our country, and the world our children will inherit. This paper highlights the key outputs from the AMEDD 2039 Futures Project Phase 2, and is organized according to VWG topic and divided into four main sections:

- Provocative forecasts that IAF abstracted from VWG Final Reports and then from individual papers;
- Recommendations for the AMEDD presented by each VWG Leader to the TSG;
- Lessons learned from Phase 2 and recommendations for a Phase 3; and
- Appendixes of each VWG report and individual papers submitted for this project.

Provocative Forecasts

The following are a synthesis of forecasts that were presented in the VWG Final Reports:

AMEDD Leads Health Mission for Achieving U.S. Global Aims In 2039

The U.S. will not be the dominant political entity in 2039. It will hold the role of "first among equals" with the European Union, China, India, Russia and Brazil … [which] will require the U.S. to work much more cooperatively with nations and non-state actors to achieve political goals … Non-state actors [multinational companies and NGOs] will play a major role in addressing resource shortages, particularly … food and water. [VWG 6]

[The] 2039 military operating environment … [is] a complex network of state and non-state actors creating challenges on multiple continents … many as a result of overpopulation in under-developed areas and wasteful consumption in developed areas. In 2039 sickness prevention is an economic issue, not just a healthcare issue, as businesses, communities and governments come together to address behavioral and social challenges leading to expensive ill health in a population. [VWG 5]

[N]atural catastrophes will continue to require military assistance … We might often be deployed for extended periods of time to provide stability and build capacity for self sufficiency in a region …

Personnel are also expert in helping build health infrastructure and teaching local professionals how to effectively create their own health systems. [VWG 5]

The U.S. strategic goals will focus on continued economic growth in areas of the world that are outside [the] growing circle of economic prosperity that globalization has created. While enemies still create security threats that war fighters face, military medicine works to reduce the number of areas in the world that support those enemies. U.S. military will still be relied upon to be [a] major security provider in…hot spots, but [building] security will be…more through relationship … than at the point of a gun … [VWG 6] In 2020 one of [AMEDD's] biggest exports is 'health' to the Geographic Combatant Commander's area of involvement. [VWG 1]

With regard to military operations … [on] the battlefield … increasing [the] emphasis on non-kinetic operations supporting civil authorities … [These] operations demand a high degree of diplomatic skill from AMEDD leaders and mental agility to move from combat to humanitarian support within the same operation. [VWG 5]

In 2039 the "conventional" war machine … will look drastically different with fewer war fighters in harm's way … with … combat controllers working at a remote location. [VWG 5]

AMEDD will still provide direct patient care to beneficiaries and to selected patients within deployed populations, but their primary role will be integration of medical training and resourcing within specified high risk regions throughout [the] globe. AMEDD will be [a] valuable arm of U.S. geopolitical strategy building bridges to peace by making global health a politically stabilizing force. [VWG 6, VWG 1]

[A] cabinet level position [will be] created to help coordinate U.S. Government activity with multi-regional companies and NGOs … co-equal with Secretaries of Defense and State. [VWG 6]

Jointness & Beyond in the 2039 Healthcare Model

The cost of health care will prompt national governance that includes the military health system, the VA, Health and Human Services, and civilian health organizations in joint efforts that … ensure the quality of healthcare services … [and] medical readiness of the armed forces … [with a] National Insurance System. [VWG 1]

Over the next 30 years there will be a shift from the medical home to home self-care and prevention to virtual self-care in cyberspace to prospective medicine and auto-care facilitated by nanobots. These changes in care venues will dramatically change the role of the hospital to a few regional high capacity facilities shared by all health providers. [VWG 2]

In 2039 individuals will be the driver of their health care rather than recipients of it. Data of their health status and behaviors will be continuously, automatically captured by sensors and displayed on an electronic dashboard. Individuals will have the knowledge and assistance to control their health, but they will be accountable and responsible for their outcomes. [VWG 2]

Virtual knowledge management [is] the driving enabler of health … [through the] Health Advocate Avatar—an intelligent agent to detect diseases, repair cells and eliminate harmful pathogens while monitoring guidance from health providers on our behalf. The education avatar remains engaged

with Service members throughout their career. Medical education programs and curriculum … [develop] through hybrid wikis and virtual campuses that facilitate expert collaboration around the globe. [VWG 1, VWG 2, VWG 3, VWG 4, VWG 5]

By 2019 the database … to assess treatment modalities against healing has give us a true evidence-based practice. This has yielded total transparency on costs and results of care. [VWG 6]

Predictive, preventive, personalized and participatory medicine focuses on pre-disease. [VWG 2] Most diagnostics are done remotely, and even virtual exams and surgery are often performed robotically (without cutting the skin). [VWG 5] Within ten years we will be able to seamlessly heal most combat wounds … Within 30 years the complex problem of in vivo limb re growth is likely to be solved … Regenerative medicine will expand from "cure" to "prevention." [VWG 2, VWG 5, VWG 4]

2039 Healthy Communities

For millions of Americans we fabricated psychological body armor including a capacity … [for] healthy bodies, mental resilience and spiritual hardiness … [This] psychological body armor has created the ultimate safety net made up of relationships, sense of community and mind-body competency. [VWG 1, VWG 6]

The social networks … have proven to be the perfect milieu for motivating personal and communal accountability toward healthy living, emotional resilience and healthy environments. Social networks link the base community and a global network of compassionate experts who effectively work on health dynamics. [VWG 3]

From pre-schools to chapels to mass media, topics such as nutrition, resiliency, active lifestyle, group well-being, tactile and social group cohesiveness, and self efficacy are taught and enforced. [VWG 3]

[The] Army green ethos lures top quality individuals and families into Army service and retains them beyond their ten-year commitments. Now off-grid Army posts are self-sustainable. Solar-thermal microwave energy works [in 2039]. [VWG 3]

Alternative Forecast for Unhealthy Future Communities

American society is sliding down Maslow's hierarchy of needs. Belonging, esteem and self-actualization are losing out to concerns about safety and security. The basics of life are no longer a given … The media, in an effort to be noticed in a crowded market, celebrates deviant behavior and attacks traditional values and institutions … The pool of potential Army recruits is at an all-time low… [VWG 3]

Optimization of Health Achieved Through Science & Technology

In 10 years we will be able to seamlessly heal most combat wounds and eliminate scars by inhibiting tissue fibrosis, grow[ing] organ and tissue patches to facilitate surgical repair of damaged or diseased

body parts, and induce[ing] bone and cartilage to grow in vivo using bioactive frameworks that degrade once regrowth is complete. Within 20 years we will be able to regenerate digits and induce moderately damaged organs to repair themselves in vivo. Badly damaged organs will be regrown and transplanted. By 2039 the complex problem of in vivo limb regrowth will be solved. [VWG 5]

Internal diagnostics using a nano-scale camera swallowed as a pill can prevent … multiple exploratory surgeries. First generation RoboMedics … [will help] assess casualties in sustained hostilities. Life Support for Trauma and Transport (LSTAT) high-tech trauma pods … [support] reversible metabolic hibernation without tissue damage … Combat Medical Vehicles (CMD) made of lightweight but strong materials will provide advanced trauma life support to critically injured soldiers. [VWG 4]

[In 2039] … advances in field treatment include nanoparticles to decrease inflammation in wound healing and burn injury and nanosystems to detect injured blood vessel walls and apply payloads of vascular glue, chemicals or heat to stop internal bleeding. [VWG 4]

Developments in biology and neuroscience will … transform capabilities related to fatigue, cognitive degradation and enhancement … The level of computation used in Avatars … will also make possible new generations of advanced prosthetics and strength-enhancing exoskeletons. [VWG 4]

New advances in simulated tissues and multi-texture human systems will allow realistic training in near-live tissue to facilitate student training on mental skill development to enhance … reading comprehension, critical thinking strategies and time-management skills. Through brain-computer interfaces using dynamic learning biofeedback, resilience is instilled to achieve maximum results in courses. [VWG 4]

The field of neurotechnology develops ways to increase the speed and amount of material an individual is able to learn, creating "super students." [VWG 5]

Professional Staff and Professional Roles In 2039

People will be able to work much later in life, and the standard 20-30 year career will expand so that qualified personnel might stay on active duty until the age of 70…. The use of genetic and proteomic data in Soldier preventative care will be used to create a career health plan and counsel Soldiers throughout their service. [VWG 5]

Medical instruction will be augmented … through devices that affect cultured neural networks. This interface between computers and the brain … relays data to enhance … learning capacity. [VWG 5]

Agents (service members of all types) … undergo rigorous evaluation for selection, beginning as early as conception for some special needs to as late as middle school for the rest. Service in the U.S. Medical Alliance is a sure stepping stone to top corporation positions and political office. [VWG 5]

Sample Forecasts from Individual Papers

The following forecasts were presented in individual papers:

The Geo-political Role of the AMEDD

[A] surge in urbanization, water/food/energy shortages, pandemics, global economic collapse, civil disturbances, terrorism, and domestic/international crisis may strain the public and private healthcare system to a critical point of failure. [VWG 1]

Whether we agree with it or not our military (and military medicine) is being used globally as a politically stabilizing force. This trend will continue in future decades … jointness … for 2039 … should be viewed … as an event … that requires … leaders to accept a paradigm shift … The reorganization of Military Medicine will be driven by our Nation's desire to avoid armed conflict. As the world's 911 emergency service, people and government around the world look to the military health system in a catastrophe … Our success will mean less violence against Americans. [VWG 1]

In our own country we have microcosms of poverty and decreased access to education and healthcare … These populations could contribute to destabilization … [VWG 1]

[T]he world will add about 60 million people each year reaching a total of about 8 billion by the 2030's … 95% of the increase will take place in developing countries. By the 2030s, every region of the world will likely contain local economic power or regional organizations capable of leadership … [T]he United States will often find it prudent to play a cooperative or supportive role in military operations around the world … [T]he skills of a diplomat … must be in the tool kit of commanders, staffs, and personnel throughout the Joint Force. Parallel to this is the ability of military medical professionals to work in support of … these powers' military medical personnel. [VWG 5]

In 2039 the military operating environment will be a complex network of state and non-state actors creating challenges on multiple continents. The threat of a conventional war will be less likely as migration to mega cities has diluted ethnic and cultural boundaries. Developed and developing nations continue to struggle with the influx and growing number of cultures and religions. Ethnic and religious driven conflicts are double that at the turn of the century and the Developed world must come together in a global cooperation to manage these conflicts and … the developing nations. [VWG 5]

Jointness & Beyond in 2039

The influx of technology savvy … tweeters … generation of health professionals … became the catalysts for a cohesive and holistic Federal healthcare delivery system. They were disruptive agents … focused on patient care rather than service parochialism. [VWG 2]

By 2020 we have made the transition to a military healthcare system that is focused on the needs of the Geographic Combatant Commanders. [In 2039] the economic realities of the cost of health will

prompt national governance that includes the military health system, the VA, Health and Human Services and civilian health organizations. [VWG 1]

[In 2039] Geographic Combatant Commanders [joint] health commands … deploy sensors, knowledge management … and interventions in at-risk populations throughout their areas of responsibility contributing to global health and stability. [In 2039] Real-time sensors identify service members who are at risk to stressors and allow medical personnel to intervene even before they become causalities. Sensors are also used to identify, locate … triage and stabilize service members at the point of wounding, allowing even more timely critical care and evacuation. [VWG 1]

The JMHS [Joint Military Health System] has operational plans to respond to mass civilian causalities from natural disasters, terrorist attacks and WMD on a continental and global scale. [VWG 1]

The 2039 Healthcare Model

[V]irtual knowledge management … and the use of decision support, clinical workflows … for patient care and clinical research … will help build a community of users, researchers and suppliers … that comply with the highest possible quality, safety and ethical standards. [VWG 1]

In 2039, no longer will patients be recipients of care; they will be the driver of their health care. Patients will receive the majority of information about their health … from an electronic dashboard … physiologic and psychological data … and behaviors will be captured daily from … biosensors and data will be sent to [a] community IT Health Center … Healthcare professionals … will provide detailed algorithms to each patient and geographical communities with determinants of the levels of risk for health outcomes at the individual and community level … The concept of a medical home will evolve to a "health IT home" in which patients and communities will take responsibility to drive their health outcomes. [VWG 2]

By 2039 … technology can now more accurately forecast an individual's health with predictive models, biomarkers and genetic data that quantitatively determine the risks for developing certain conditions and reduce the morbidity and mortality of chronic diseases. Pre-disease management allows for individually tailored interventions and targeted treatments with preventive or diseases-delaying medicine. [VWG 2]

People turn first to cyberhealth whenever there is a health issue … A key component to health is virtual communications with 'people like me' who can provide truly personal advice and emotional support. [VWG 2]

The need for large hospitals will be reduced to regional solution shop hospitals and the need for inpatient care will be minimal. Recovery will be resort type facilities … Outpatient care will be mostly remote. [VWG 2]

Facilities in 2039 are designed to create a patient and staff centered healing environment. These facilities also house research into new diseases as well as experimental therapies. [VWG 2]

Health care will advance and change the way we live over the next 30 years. In 2039 much of an individual's health management is done ...through … the individual's ultra intelligent Health Advocate AVATAR … Devices are implanted or worn … Nanobots within the body go to the site of the disease or injury to correct the problem … [or] destroy pathogens or toxins … [VWG 2]

Personal avatars, 3D visual or voice only … act as intelligent medical and social butlers. [VWG 2]

The Physician and the nurse are responsible to encourage behavior change to healthy lifestyles … The care coordinator integrates all the services … The avatar is in charge of managing the patients needs. [VWG 2]

The avatar is … interactive. It detects motion and can differentiate between persons. Medically applicable preferences are set by the users, but can be augmented by any member of the team based on temperamental and cognitive need. The avatar is responsible for encouraging behavior, change to healthy lifestyles, [and] reinforcing compliance with therapy and wellness evaluations … [VWG 2]

Individuals are living longer and sometimes require nursing homes and assisted living facilities if they can no longer "age in place" with technological assistance at home … Semi sentient robotics, which serve in harmony with the 3-D holographic avatar are made available to support the patient and control personnel costs. [VWG 2]

Warrior medics … have scanners that are linked to MAAM (Medical Avatar Assistance Monitor) should the patient's injury or illness preclude them from making a self referral … [VWG 2]

Healthy Communities

There will be pandemic catastrophes … that will challenge all of our leaders … We will experience loss of life on a very large magnitude … but … we will endure through adversity and build … healthy communities. [VWG 3]

[O]ver the next 10 years all health and well being assets will be included under the umbrella of Community Health Promotion Council … By 2019 the mission of the council will … broaden to include developing strategies that build community resilience and health … moving from risk factor interventions to Human Performance Optimizations … [VWG 3]

Empowering patients with mental health disease, dementia and physical disabilities and cognitive deficits will require novel approaches involving communities and families in the delivery of healthcare and promoting healthy behaviors. [VWG 2]

Community lifestyle and poverty levels will see vast improvements over the next 30 years. [P]ositive psychology methodologies integrated with early childhood education on nutrition, resiliency, active lifestyle, group well-being, group bonding, and self efficacy has led a vast majority … to work together for the common good … [VWG 3]

In 2029 … resource allocation will be based on installation needs for force and Army family … to function at the highest level of health. [VWG 3]

Wellness centers located at worksites, schools and communities are focal points for the delivery of pre-disease interventions … For active warriors, strategic personalized health plans … maximize individual health and performance. [VWG 2]

By 2039 the coalition will become advocates for increasing levels of health and well being … [T]hey have the ability to address local health concerns and mobilize resources … and make recommendation to high level headquarters … [VWG 3]

In the year 2039 … the benefit of strategic avatar placement has … improved … community health … As a result, poverty will no longer be an obstacle for obtaining quality health information, guidance and education. [VWG 3]

The average community size has shrunk … With the focus on walking and riding bicycles a large portion of our nation made personal decisions to move away from the larger cities. The average school classroom size across the country has dropped to 10 to 12 in all grades. The children are in classrooms for shorter amounts of time because the government has invested in robust technologies … Because of the emphasis to increase our technological abilities to telecommute the average citizen works only 20-24 hours a week at the office. [VWG 3]

[T]he students of our nation are learning a total of at least four languages, including English before they graduate … They are also introduced into the cultures of the countries … and gateways into the business settings of the … countries. The overall consumption rate[s] of [alcohol and tobacco] are at all time lows … The revivals of religion have been a strong foundation in the success of health [in] communities. [VWG 3]

Generation Z is the first of many generations that has always had an electronic medical record since … birth. This generation routinely begins the education process at the age of four and is ready to begin college by … 16. The organization skills of this generation [are] phenomenal and their memory capabilities are four times that of previous generations … [VWG 3]

The continued progress of healthy communities across the US is monumental. The fitness levels of the civilian populations are just trailing that of the active military force. [VWG 3]

To promote active lifestyles, military beneficiaries are encouraged to participate in green co-op gardening … Educational programs to promote healthy food … improve overall installation health. [VWG 3]

By 2039, recycling has reached an amazing effort on Army installations … this promotes fiscal responsibilities of garrison citizens and makes it an honor for them to live on post. [VWG 3]

The landscape on Army installations will appear different as rectennas, rectifying antennas that convert microwave energy into direct current, will pop up throughout the post. Solar Based Solar Power (SBSP) generation, produced in space and collected on unmanned satellite stations, collect solar thermal microwaves and beam them back to garrison storage stations. Garrison converts these microwaves into usable electrical energy which may be used for Army vehicles, facilities and housing. [VWG 3]

For POV and some Army vehicles, two other types of fuels have been developed: one developed from water (NREL) and the other from alga[e] … [T]hese engines are carbon neutral … Army vehicles use this type of engine because the cost prohibition of fossil fuels. For engines requiring much greater horsepower, like aircraft and trains, algae derived oils allow the Army to produce cheap but high quality fuels. [VWG 3]

By 2019 both aerial and ground combat vehicles will be unmanned … By 2029 we will have robotic soldiers … By 2039 the potential for an entire robotic force will [have us] on an ethical pinnacle in identifying if killing is indeed the correct course of action. [VWG 3]

In 2019 … programs … will enhance the mental and physical resiliency; reduce the burden of injury and illness, foster rapid recovery … the next leap in 2029, to utilize bio-metric monitoring systems … to respond to the … states of the individual … By 2039 … it may be necessary to build in empathetic feedback responses in order to maintain the moral/ethical clarity and impact of killing from a remote location. [VWG 3]

[W]e will be able to deploy missiles, radiation, robots, sound wave technology, radar or other means of killing from great distances. This increased technology will reduce the interpersonal impact of death on the individual required to kill for his or her country … When killing becomes relegated to a video game event we have dehumanized death … Our future soldiers may … by day be remotely killing enemy soldiers in a distant country from their home station computers … At the end of their duty log, these same soldiers will drive home to coach soccer games and read stories to their children. [T]hese soldiers are more prone to … PTSD. [VWG 3]

As military communities of the future develop, commanders will increasingly be required to understand … the health and well being of Soldiers and Family Members. Commanders will not just be leaders of people into war, they will become responsible for the mind, body, spirit ramifications of war plans … Rather than leaders trained in strategic warfare, we may move to leaders trained in human performance optimization. [VWG 3]

In the next ten years the Army will … formalize the standard of imbedded health professionals on the brigade and/or battalion level that foster health as a part of the unit environment. These assets will then become part of the unit culture and be available for on the spot assessment of physical, psychological and spiritual impact of remote and onsite warfare. [VWG 3]

… [T]he war fighter of the future will have training requirements that incorporate mental, spiritual and physical exercises … a return to the ancient Chinese warrior development that include activities of mental, spiritual and physical balance as they train … to separate the act of death from their interaction in society. [VWG 3]

The ultimate venue for health creation in 2039 is a society dedicated to providing the milieu for healthy living and emotional support in families, neighborhoods and communities … Societal interventions eliminate health disparities and provide emotional well being. The alternative forecast is … [that] costs will continue to rise and allure of fighting against death will create high demand in a population that is older and sicker in 2039. Budgets will overrun the willingness to pay, and policy makers will … squeeze vulnerable facilities, especially those that serve the poor … [VWG 2]

Alternative Forecast for Unhealthy Future Communities

So what could possibly go wrong? 2019 – The U.S. economy continues a gradual slide … [which] causes a loss of the tax base at the state and local levels. As a result, local governments are forced to cut services and communities around Army installations slowly begin to deteriorate. [VWG 3]

Because of increased poverty in the community, more recruits enter the Army just to feed their family and have access to affordable healthcare. The Army begins accepting the dregs of society into our forces. Poverty rises on post and thus crimes increase. [VWG 3]

The op tempo has continued at an unprecedented level as the war on terror enters its 18th year. Recruitment and retention of military personnel has been poor … The notion of service has been replaced by partisanship and personal gain. 2029-2039 … American society is sliding down Maslow's hierarchy of needs. [VWG 3]

The U.S. is no longer a leader in the global economy … Unemployment in most of the country has been hovering over 20% for a decade and crime is rampant. With the increasing demands of work and financial survival, fewer citizens are becoming involved in neighborhoods, churches and civic organizations. [VWG 3]

Socialized medicine, fully implemented in 2032 has dramatically changed the face of health care and reduced the appeal of medicine as a profession … Government leaders have cut military medicine to the core … Public health has also taken a hit. [VWG 3]

… [T]he incidents of preventable diseases continues to climb in 2039. Obesity is at epidemic proportions … Lung cancers, sexually transmitted diseases … diabetes, cardiovascular disease, asthma, low birth weight infants and mental illness remain at enormous levels … Americans die in their early age from chromic preventable diseases, dropping far below other nations. DoD's ability to attract and retain healthy recruits is dismal at best. In general, less than 5% of the U.S. population in 2039 meets entrance criteria for the military. Those who meet entrance requirements choose other work and find no value in being a member of the military. So DoD is forced to take recruits who are sub optimally fit and work them into shape. Recruitment costs quadruple. [VWG 3]

Increasing numbers of Soldiers are forced to accept food stamps just to make ends meet. Families are irritated, hungry and are unable to cope with stress of work and the stress of society. [VWG 3]

In 2039, the cost of everything has soared … Heating and cooling costs have … increased extraordinarily … Everyone is in … survival mode. [VWG 3]

Army Weather Brigades accurately forecast … to local communities, predicting 5 days in advance of severe weather. In 2039 … weather steering of hurricanes and severe thunderstorms is possible. In 2039 … the cost of gasoline … has raised to $20 per gallon … [VWG 3]

… In this depiction of 2039 … Families, churches and community organizations actions have lost their vitality and influence … The result of failing community capacity is generally poor quality of life and high rates of destructive behavior, crime, physical and mental illness and death. [VWG 3]

Optimization of Health Achieved Through Science & Technology

[By] 2019 … Our knowledge of growth factors and growth inhibitors now allows us to seamlessly heal most combat wounds and eliminate scars … We have also perfected our ability to grow organ and tissue patches to facilitate surgical repair of damaged or diseased body parts … We can now regrow shattered bones and rebuilt broken faces … Surgeons now routinely stimulate new cartilage growth for our arthritic patients, and Diabetes is becoming scarce as the injecting of insulin – producing, pancreatic islet cells directly into the pancreas becomes routine. [VWG 4]

[By] 2029 … Digits can now be fully regenerated in vivo, but full limb amputations still require in vitro reconstruction and transplantation … Moderately damaged or diseased organs are now chemically induced to repair themselves in vivo but organs too badly damaged to repair are regrown at the AMEDD tissue and Transplant Center (ATTC) and then transplanted. Non-immunogenic organs like the heart, kidney, lung, and liver, are routinely grown at the ATTC and maintained in our Tissue and Organ Stockpile (TOS) for emergencies. This stockpile also furnishes our forward surgical teams with replacement parts … Our retirees also enjoy the benefit of regenerative medicine as death from heart disease and cancer has largely been eliminated. Spiral cord injuries can be completely repaired, and neurologic disorders like Parkinson's Diseases and Epilepsy are now considered curable. [VWG 4]

[By] 2039 … We have solved the complex problem of in vivo limb regrowth. Auto immune disorders, heart disease, cancer, diabetes, hypertension, kidney disease and asthma … are easily cured. If a Soldier or any military beneficiary survives an initial traumatic wounding, it is unlikely that they will die. Critically wounded patients are immediately placed into a semi suspended state … and maintained on life support while their injured body parts are repaired or replaced. Additionally, the scope of Regenerative Medicine has now expanded from 'cure' to 'prevention.' DNA mapping and biochemical analysis is now routinely used to create a baseline for all our beneficiaries … If detected early, minute biochemical changes that may herald impending health problems are easily detected and treated … The majority of our outpatient visits are now for prevention, obstetrics, and health promotion. Many of our inpatient wounds have been converted to same-day Tissue Repair Suites … [VWG 4]

Large knowledge banks of population, disease, genomic and other key data are available through the collaborative of medical, government, corporate, research and pharmaceutical enterprises. Genomic information is utilized to predict responses to certain drugs and environmental substances permitting the production of cost-effective pharmaceuticals with reduced toxicities. Following the tremendous success of cancer nanotechnology programs to detect, diagnose and treat cancerous changes, other pre-disease applications for nanodevices are being widely used in 2039 … on a cell by cell basis. [VWG 2]

… [I]n 2039 … 'The race for biomedical and genetic enhancement will in the twenty-first century be what the space race was in the previous century.' [UCLA Professor Gregory Stock] … [F]uture enhancement of physical and cognitive performance. In 2039 Soldiers will be provided NanO-geneTeck (NOTK) survival kits weighing less than one pound. NOTK foods will contain high energy peptides and contain stealth nano-particles … with essential vitamins and minerals … which will be released in response to stress … A new line of high tech fibers will allow Soldiers [to] jump higher and run farther than ever before, and assist Soldiers in defeating adversaries. Clothing and

exoskeleton technology will be greatly enhanced by new materials such as carbon nanotubes, transparent alumina (3X stronger than steel and transparent) metalfoam, and Aerogel ("frozen smoke," 99.8% air, highly durable). These uniforms will provide the ultimate 'preventative medicine' against combat injuries. [VWG 4]

The genetic revolution will lead to great advances into the mechanisms of human fatigue and cognitive degradation associated with human performance. Clinics will … examine Soldiers and determine necessary genetic modifications needed for optimal or enhanced performance for a specific mission. We will witness genetic disruptive technologies for enhanced human performance … and disease and injury prevention. Genetic engineering clinics will be … re-growing severed limbs, giving back or … [enhancing] eye sight and hearing to the deaf. [VWG 4]

Combining different modalities of treatments to include epigenetic therapies, optimization of one's genetic expression by maximizing healthy lifestyles and environmental exposures, and IPS (pluripotent stem cell phenotype) interventions, MEDCOM providers are able to delay or minimize Soldier's responses to stress on the battlefield and improve the overall health of the armed forces. [VWG 3]

Disruptive technologies improves life spans and postpones disabling conditions … We will be able to deploy Soldiers to extreme environment (hot, cold, chemical) and remain confident that … most physical damages that might occur can be repaired. [VWG 4]

Bionic eyes worn as one contact lens will imprint electronic circuits and lights plus zoom-in functionality to distant locations … a possible platform for super human vision … future bio-imaging capability … ultrasonic bionic ears, functional near-infrared spectroscopy and EEG nanoscale imaging … hand held scanners. [VWG 4]

Nano scale imaging holds potential far hostile environment body scanning … by supermedics or robots. [VWG 4]

Far forward application of internal wireless fiber optics will prevent casualties from receiving multiple exploratory surgeries across the evacuation chain … Wireless internal nano-images will be uploaded in vitro in 2015-2020. [VWG 4]

In 2020-2025, nanoparticles and nanoshells will be able to detect injured blood vessel walls and apply chemical, lighter heat to tissue walls much like surgeons cauterize bleeding blood vessels in surgery. Additionally vascular glue … delivery to combat internal bleeding of casualties in 2020 … delivered by a robot, or implanted … a priori. [VWG 4]

In 2025 – 2039 supermedics will remotely control a variety of RoboMedics … to deliver initial emergency medical diagnostics, interpretation of results, initiate … treatment and manage biological or chemical assaults … RoboMetics will assist … when evacuation teams are unable to access casualties in sustained hostilities … [VWG 4]

Smaller medical robots … sustain life by … augment[ing] survivalability of blast, penetrating, blunt, chemical and biological casualties. Examples of diagnostic robomedic functions include delivering, measuring, and monitoring 02, monitoring exhaled CO2, using casualty blood to upload field lab-on-

a-chip fluid valves, and perform full body scans. Treatment robomedic functions will include cleaning a 'dirty wound' using spray biobots to decrease wound bioburden, applying shape-retentive wound dressing in situ, activating exoskeletons to stabilize fractures, and delivering antibiotic and pain medications similar to the concept of pre-hospital treatment. Remote bone alignment … for open extremity fractures will be delivered at the point of injury by RoboMedics. [VWG 4]

Unmanned air vehicles will administer hydrogen sulfide to casualties … achieving a reversible metabolic hibernation without tissue damage … to casualties until extraction and transport to trauma medical center is complete. [VWG 4]

[In 2039] Soldiers on the battlefield will be wearing medical sensors that send out distress signals if inquiry or sickness occurs. Flight crews will respond rapidly and render advance medical care while in flight. [VWG 4]

Lab-on-a-stick will be used to diagnose infectious disease, deliver micro RNA profiling, perform blood typing … monitor military and indigenous population health … with robust reliable analysis. [VWG 4]

Advanced diagnostics and sensors coupled with artificial intelligence and medic-in- the-loop interfaces will create real time therapeutics before traditional clinical signs and symptoms present. [VWG 4]

… [T]he same smart, active technology that will be used in building the new generation of avatars could also be integrated into the next generation of prosthetics. [VWG 4]

Prosthetics … better mimic human movement … for improved adaptability of patients to smart, predictive prosthetics. [VWG 4]

To assist Service Members in their continuum of education and training, a personalized Avatar is assigned to them when they first join the Military. This avatar guides the new recruit to prepare for the next level of training as they progress through their basic training and advanced studies. The education avatar learns the cognitive traits of the individual and uses the military's extensive training databases to continuously review and evaluate previously learned skills and critical knowledge sets … The personal education avatar assesses each new medical course that an individual is scheduled for and systematically sequences previously unlearned lessons for maximized pre-course development … [T]he education avatar remains engaged with them throughout their career, updating them on new medical findings and ensuring they are aware of the latest information … The career long avatar has the ability of contacting its 'owners' through all electronic means … when medical emergencies occur (i.e., a pandemic outbreak) and advises them on appropriate actions. [VWG 4]

By 2039, the preponderance of medical education will be tailored to the individual learner and less structured to a core curriculum delivered uniformly to classrooms of students … [VWG 4]

Some learning is accomplished through devices that affect cultured neural networks. This interface between computers and the brain is made possible by advances in biocompatible materials, non-invasive sensory leads to the brain, and computational technology that relays data to enhance the learning capability of students. Students will gain medical knowledge through this brain-computer

connectivity, often outside of the classroom and through portable, personal devices that provide education reinforcement of highly complex medical subjects. [VWG

Advances in simulation will enhance … learning … More responsive, situational aware models will improve the realism of the increased human – computer interaction resulting in more effective training and reduced mental barriers … New advances in simulated tissues and multi-texture human systems will allow realistic training in near- live tissue … Human and animal mannequins not only replicate flesh like tissues, but also fluids, sounds, and smells of real patients, incorporating greatly enhanced feedback sensors that respond to treatment and communication from the provider. [VWG 4]

To add to the realism of education … The physical layout of the "classroom" morphs through multi-sensory projection, to the desired environment … Virtual walls and virtual medical attendants … add the realism. [VWG 4]

Medical instruction will be augmented with animated digital holograms, providing three dimensional diagrams of the entire human anatomy. Interactive holograms will allow realistic visualization of the anatomy under study, with the ability to manipulate the parts for a better understanding … [VWG 4]

[M]edical professionals around the globe, even those on the battlefield … assist in shaping the instruction with the latest lessons learned. [VWG 4]

The evaluation of skills is accomplished through motion tracking, sensor data capture and build in sensing systems that provide unbiased error-tracking and feedback assessments for all students. Many courses are taught through a virtual campus providing … a mix of human and computer academic instruments and advisors. [VWG 4]

Telementoring and online classroom projection makes the virtual classroom available to anyone world-wide, even deployed personnel undergoing skills training in a combat zone. [VWG 4]

In the future as computer programmers and engineers respond to the demand for more realistic human behavior in avatars, we will create innovative technology to manipulate human trust… [VWG 4]

Through integrated medical databases and personal avatars, each person will enjoy personalized health advice with the sound backing of the most recent medical science. Health interaction 'kiosks' provide remote health professional and computer assisted testing diagnoses and advice. The empowerment of all personnel is achieved when the kiosk becomes a dynamic learning platform that provides relevant, sound medical education targeted at promotion of disease prevention. [VWG 4]

If a patient is too sick or busy to visit a doctor, their … avatar will "sit in" … It will be awesome to be two places at once … [VWG 4]

Professional Staff and Professional Roles In 2039

From 2029-2039 we would also add a "technological health" area ... to the community/system … if PTSD has the potential to increase in severity as a result of technological killing. [VWG 3]

Increasingly, hospitals will deliver care using robotics. Further, robotics will be prominent in the homes of patients with chronic diseases and in meeting the needs of vulnerable populations. [VWG 2]

"Best practices" will move to evidence-based community treatments, interventions and preventative methodologies as well as evaluating individual patient outcomes. The focus of local health agencies will be on community and population health rather than the individual's health. [VWG 2]

In 2039 the "conventional" war machine … is ... technologically advanced … unmanned and autonomous fighting systems … We will have fewer Soldiers, Sailors and Airmen in harm's way. [VWG 5]

[A] series of advances and breakthroughs will drive our entire organization structure from delivery of health care to command and control in 2039. From … the electronic medical records to … nanotechnologies, revolutionary technological change on an exponentially growing scale … mandate that military leaders institute a continuous transformation process that includes all areas of doctrine, training, leadership and organization … [I]t is a vastly more profound transformation due to the synergy of flow emerging technologies: bio-engineering, nano-engineering, robotics, and artificial intelligence … [I]t is a revolution that will occur at a speed never seen before. [VWG 1]

Recommendations

The Geo-political Role of the AMEDD

1. Begin training of all AMEDD officers in importance of stability operations and in the role military medical forces play in such operations.
2. Actively engage interagency colleagues, multiple NGO's, IGO's and industry in planning of medical HA missions throughout globe.
    - Begin discussions of integration of data and communication systems.

Jointness & Beyond in 2039

1. Reorganize AMEDD to drive integration toward joint governance
2. Engage sister services and DoD leadership to create a Joint Medical Force
3. Leader Development
    - Futures seminar for all CCC. TWI, ILE and SSC students
    - Continue cross-pollination with sister services, other Federal Departments and civilian entities
    - Explicitly address cultural barriers

The 2039 Healthcare Model

1. Lead R&D progression from electronic health records to knowledge systems and avatars supporting integrated care and empowered patient self-care
2. Lead development and implementation of prospective accountable health (predictive, preventive, personalized & participatory medicine)

Healthy Communities

1. Incorporate training about social, physical, and psychological health across all Army domains.
2. Reallocate AMEDD resources to orchestrate community based social networks.
   - Construct healthwise nodes and ties
   - Develop community coalitions & wellbeing strategic plans
   - Shift the health care epitome
   - Increase capacity for care provision beyond the level of the individual
   - Develop a community wellness dashboard

Optimization of Health Achieved Through Science & Technology

1. Introduce Regenerative Medicine facilities planning to develop specialized laboratories and transplant capabilities and conduct human trials of early Regenerative Medicine applications.
2. Be an early adopter of personal health avatars.
3. Develop "Early Signals Network" including combat commanders, command surgeons, and NCO's to quickly detect emerging health and performance needs.

Professional Staff and Professional Roles In 2039

1. Develop flexible, responsive manpower system that proactively responds to changes in demand for new skill requirements driven by the influence of technology and markedly increased work lifespan
2. Develop proactive recruitment efforts targeting quality international medical personnel and programs to place AMEDD personnel in international training programs
3. Prepare Military Medicine to simultaneously support combat, diplomatic, and stability efforts

Lessons Learned

Participants developed a far-reaching view of future possibilities and made coherent recommendations about how to prepare the AMEDD effectively for a future that will be different. The papers and conversations generated by the participants reflect an extensive review of trends currently determining the future of warfare, health care, military medicine, global stability, and other issues. Furthermore, the participants demonstrated their ability to create provocative forecasts with the potential to reshape current practices, and lead the AMEDD to the future that they desire. Phase 2 generated significant capabilities in futures thinking, as well as the ability to apply learnings to everyday life. A summary of lessons learned identified by the participants include:

- Participants have found the AMEDD Futures 2039 Project a valuable learning experience, stating that it completely changed their thinking, especially when reading about current events.

- Researching the future, especially the year 2039, helped to identify the possibilities, challenges, and opportunities that the future holds. One participant mentioned "how encouraged I am by what the future might be."

- Participants identified futures thinking as an essential tool to instituting change within the AMEDD. One participant noted that "day-to-day…all the thinking is resource-constrained," but this project allowed him to think outside the box and "try to shape the future of the organization [my daughter] may be leading." Another participant noted that "the Army and the AMEDD have been transformed in the last 30 years" and that "the challenge is to focus people on thinking outside the box and not be so narrow-minded to think about not just today."

- A sustainable futures capability should be standardized and integrated throughout the AMEDD. One group recommended adding a futures seminar for all TWI, ILE, and SSC selectees. Some participants suggested that futures training should start as early as ROTC. Others suggested adding younger participants to the AMEDD futures process to bring different perspectives and to provide today's leaders with a "reality check" of their expectations for the future.

- Many participants saw the futures process as essential to their high aspirations for the AMEDD. One participant commented that she was "impressed that the AMEDD took on a project like this to be so future thinking" and that this work was "critically important to what I am doing."

During the process of Phase 2, lessons were also learned that should be taken into consideration when planning a Phase 3:

1. There are AMEDD Officers with the capability and interest in futures; however, they are overloaded with current duties and cannot be expected to make a substantial contribution to this type of work unless time is specifically dedicated to this effort within their current duties.

2. There were positive report outs regarding futures thinking capability and the ability to forecast; however, the designated online discussion site and teleconferences were inadequate to significantly enhance these abilities. During this phase, only face-to-face sessions proved valuable to demonstrate a futures competence.

3. Due to the demonstrated results of face-to-face learning, a Phase 3 will be successful if a minimum of two, two-day offsites are designed into the process. Further, it is necessary to identify opportunities that are economically viable to engage participants in the interim period.

The purpose of Phase 3 in the AMEDD Futures 2039 project will be to further develop the established futures thinking capability and to create a sustainable futures process within the AMEDD. Keeping the above mentioned lessons and the comments made by the TSG in mind, we recommend the following to make Phase 3 most effective:

1. To diffuse out the learning of futures, there should be a series of engagements, containing multiple presentations with time for dialogue in between.

2. Scenario development should be used to establish a foundation that will lead to a 2039 Futures Strategy Map/Campaign. This translates into strategic outcomes and the development of an internal process to achieve these outcomes.

Institute for Alternative Futures

AMEDD Futures 2039 Virtual Work Group 1 Report:

Military Medicine 2039 – Jointness and Beyond

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COL Robert G. Hale
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Mr. Rich Beauchemin
COL Thomas R. Tempel Jr. (Group Leader)
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May 2009

Institute for Alternative Futures

U.S.ARMY

Explore. Aspire. Create. Evolve.

Military Medicine 2039 - Jointness and Beyond: Executive Summary

The fundamental purpose of the Military Health System (MHS) is to deploy an integrated medical team that provides optimal health services in support of our nation's military mission – anytime, anywhere. The men and women who make up the MHS aspire to be national leaders in health education, training, research and technology by building bridges to peace through humanitarian support when and wherever needed, across our nation and the globe, and by providing premier care for our nation's warriors and the military family.

There are a number of near term and long term factors driving change within the MHS. The war on terrorism has been a constant, yet evolving challenge. Base Realignment and Closure (BRAC), restationing from other-than-continental-U.S. (OCONUS) theatres to other U.S. installations, military transformation, force structure changes, and a national labor shortage for certain clinical specialties are each having direct impacts on the ability of the MHS to meet its mission requirements.

The availability and affordability of health care, increased world urbanization, megacities, and world population, global economic interdependency, exponential increases in information technology and knowledge are just a few of the change drivers that will impact the AMEDD and the MHS over the long term.

These pressures are driving transformation across the MHS and driving the greater integration and jointness of actions and activities within each of the Services. A number of initiatives mandate enhanced joint operations and interagency collaboration.

The potential integration of the military medical departments has been studied over the last 30 years and has been the subject of numerous government, think tank, and internal strategic and futures studies within the MHS.

The Military Medicine 2039 – Jointness and Beyond Group forecast that by 2020, the Military Services will be integrated. These changes will be driven by a strategic imperative that links global health and global stability as well as a fundamental realization that unity of command and unity of effort demand an integrated, joint framework to accomplish our goals. A glimpse at the year 2020 will demonstrate a singular focus on the needs of the Geographic Combatant Commanders.

By 2039, the economic realities of the cost of health will prompt national governance that integrates the MHS, VA, Health and Human Services, and civilian health organizations. The key stakeholders go beyond Combatant Commanders and DoD leadership to include the Public Health Service, Federal Prison Healthcare System, the Indian Health Services, Centers for Medicare and Medicaid Services (CMS), and others. The group also was bold enough to imagine a National Healthcare System. That would include a range of external stakeholders.

The AMEDD is currently adapting to change via the current region and structural reorganization. To meet the challenges in the future, the AMEDD should:

1. Reorganize AMEDD to drive integration toward joint governance & organizational structure that can link to larger Federal efforts.
    A. Develop C2 capabilities that are joint capable informed by resourcing realities.
2. Engage sister services and DoD leadership to create a Joint Medical Force to project healthcare as a national instrument of strategic influence.
3. Leader Development
    A. Futures seminar for all TWI, ILE and SSC selectees prior to academic year(s). Include concept in ODPs.
    B. Continue cross-pollination with sister services, other Federal Departments and civilian academic institutions- increase volume and intensity of joint assignment.
    C. Explicitly address cultural barriers to achieving meaningful unity of command and effort.

Summary of Individual Papers

Indicators That Would Drive Reorganization

The most significant changes in the Military Health System and our nation's governance will be driven by external forces. These external forces will have a direct impact on the continuum of health services as we know it today. In addition to healthcare, there are other multiple competing demands for our national budget including defense, homeland security, national infrastructure, social security and Medicare reform, and nuclear re-coring. How our nation responds to these competing demands may be the biggest influence on the future posture of the Military Health System. There are a number of external forces leading to significant national concern and predicted to drive emerging concepts for healthcare:

- The availability and affordability of health care.
- An increased world urbanization and world population.
- Increasing reliance on global economic interdependency.
- The blurring of international borders with global trade and large global corporations.
- The changing security environments and its profound effect on the nature of warfighting.
- Dramatic changes in information technology using virtual Knowledge Management as the driving enabler of health
- Disasters and emerging diseases.
- Population migrations, urbanization, and the use of multi-national military task forces.
- The overuse of natural resources

How will we react? 2020

A unified governance of military and our nation's health systems will emerge over time because our nation will recognize the importance of global health in world stability especially in emerging

nations. We will acknowledge the requirement for a unity of command and unity of effort to accomplish our goals. A glimpse at the year 2020 will show how we are progressing towards joint governance through a military healthcare system that is focused on the needs of the Geographic Combatant Commanders. Each Geographic Combatant Commander has a joint integrated medical structure. In addition to providing healthcare to our military beneficiaries, it has become apparent that one of our biggest exports is "health" to the Geographic Combatant Commander's areas of involvement.

How will we react? 2039

The reality that the cost of healthcare has become a destabilizing influence in our nation will prompt a change in the way we look at healthcare. The economic realities of the cost of health will prompt national governance that includes the military health system, the VA, Health and Human Services, and civilian health organizations. Health and life insurance organizations will more closely cooperate with the national health governance in joint efforts to reduce health and insurance costs to our nation. Some other possibilities for 2039:

- Global Force Health Protection and Fitness
- Global Casualty Care Management and
- Global Prevention

Potential Model for a Future Military Health System

Any suitable model must perform a core group of missions and key tasks. The underlying focus and activities should reflect the following tenets:

- **Medical Readiness Mission** – Ensure medical readiness of the armed forces is maintained in both peace and war time.
- **Health Benefits Mission** – Ensure that quality health care services will be provided to eligible beneficiaries either in the direct care system or with civilian managed care support contractors.
- **Sustainment –** Sustain the military health system in terms of recruiting, training, and retaining quality personnel as well as procuring and maintaining modern facilities and equipment.
- **Command and Control** – Establish a single individual who will be responsible to the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the services for the accomplishment of medical missions and who will have the authority to integrate, direct, control, and allocate resources among the various medical departments, services, and units

The healthcare industry in the United States is undergoing a tremendous transformation, and Military Medicine is no exception. Military medical leaders have a unique opportunity to be at the forefront of this transformation as they are entrusted with the largest organized universal health care system in the country. Change is nothing new to the military and certainly not to military medicine. What is different is the speed in which these changes are occurring (and will continue to occur) and the changing environment in which we operate.

The following are some of the major drivers and conceptual events that will influence how the Army Medical Department will need to organize itself for the future and several key components for a potential model on what our future military medical force will look like in the year 2039.

- **Technology -** Advances in technology will be one of the most significant "events" that will influence the organization of military medicine over the next two decades. The changes are vastly different from those of the 90s due to the speed of change and the synergy of four emerging technologies: bio-engineering, nano-engineering, robotics, and artificial intelligence.
- **Policy and Paradigm Shift -** We must think of jointness not in terms of working with sister services or with our counterparts within the Department of Veterans Affairs, but rather in terms of working with the Department of State and the Department of Health and Human Services as an operational component to policy makers. Whether we agree with it or not, our military (and military medicine) is being used globally as a politically stabilizing force. In order for us to be prepared and positioned for 2039, jointness should not be viewed as a concept, but rather an event that requires current and future leaders within military medicine to accept a paradigm shift unlike any they have experienced in the past.
- **Politics and Avoiding Conflict** - It is not likely that there will be one single political event that will overhaul military medicine in the next two decades. The reorganization of Military Medicine will be driven by our Nation's desire to avoid armed conflict. By building a "medical bridge to peace," the people in countries that could otherwise become hostile will be more likely to become our friends. Military medical leadership must accept an organization that works hand-in-hand with policy makers to influence world events.

Primary Stakeholders of a Consolidated Healthcare System "Beyond Jointness"

A consolidated healthcare system "beyond jointness", a system that involves the Joint Military Healthcare System (JMHS) and at least the Department of Veterans Affairs (DVA), could extend to all levels of government in the form of National Healthcare Insurance and a National Health System. Any consolidated system requires careful consideration and analysis of the potential primary stakeholders of the system. To identify the potential stakeholders, the stakeholders of a JMHS are analyzed before extrapolating the analysis "beyond jointness". Identifying the primary stakeholders of any healthcare system is extremely important before considering a plan to consolidate because, firstly, their involvement in the project significantly increases chances of success by building in a self-correcting feedback loop and, secondly, involving them in project builds confidence in product to ease its acceptance to all stakeholders. Stakeholders will be identified as internal and external stakeholders and by executive, end-user and supplier stakeholders in order to elucidate all entities of a consolidated healthcare system.

Stakeholders in the Joint Military Health System

- **Internal** - Secretary of Defense, Service Secretaries, Service Chiefs, Combatant Commanders, Congress, appointed medical executives and medical flag officers. Arguably, every decision maker who makes a living serving the JMHS is an internal stakeholder, to include officer-providers.

- **External stakeholder** – the customers of the consolidated system. This would include the defined beneficiaries or end-users: service members, dependents, retirees, Commanders and all stakeholders of a healthcare system designed to provide total customer solution to their healthcare needs. Suppliers, vendors, and contractors are also external stakeholders or experts (providers of service) of a consolidated JMHS.

Stakeholders "Beyond Jointness" in a Federal Healthcare System

The most natural consolidation "beyond jointness" is adding DVA responsibilities, but this extends to all healthcare entities administered by the federal government, the Public Health Service, Federal Prison Healthcare System, and the Indian Health Services. Stakeholders of this Federal Healthcare System could be identified readily as elected/appointed officials and medical executives of each respective system, and the executive overseeing the consolidated system. External stakeholders would be defined beneficiaries, commanders, wardens, village leaders and the public, at large.

Stakeholders "Beyond Jointness" - a Federal Healthcare System (FHS)

An FHS could include beneficiaries of the federal government with services provided in public and private healthcare systems. This consolidation would add the Centers for Medicare and Medicaid Services (CMS) to the system which, in essence, would add every participating hospital and provider, nationwide, under a Consolidated Federal Healthcare System, a system that would function as a National Healthcare System. Now internal stakeholders include medical executives of CMS, CMS affiliated health plans, hospital administrators, medical staff executives, university hospital executives, and every contracted medical group servicing the beneficiaries of this expanded system. External stakeholders will include large groups of citizens from the very young neonate, to the sick/disabled, to the elderly, and just about everyone in between. The only other system would be worker's compensation system and private healthcare, fee-for-service.

What Is The Status and Process on AMEDD Reorganization?

In 1973, reorganization of the Army Medical Department established the U.S. Army Health Services Command (USAHSC) as a major Army Command under the jurisdiction of Department of the Army. As the Army shrank during the post-Cold War period, USAHSC initiated a new construct where it would operate in a more business oriented posture and act like a corporation. A brief history of the Military Medical structure evolution is offered from 1973 to the present in the final paper, and is important in understanding the significant changes and the amount of time they took.

In December 2007 and January 2008, the CG, USAMEDCOM established a group to review how the MEDCOM was organized. The CG's purpose of the reorganization was summed up in his statement, "The elements of an organization that determine its longevity is its ability to project its value into the future". Additional guidance was to ensure that the MEDCOM reorganization is supportive of the CSA's Army Enterprise Initiative. The group developed five Lines of Effort which the CG approved:

(1) Realign Regional Medical Commands (RMC)

(2) One Staff reorganization
(3) Develop a Public Health Command
(4) DENCOM realignment
(5) WTU/AMAP reorganization.

The outcome of this effort will be: (a) re-aligned the RMC boundaries along TRICARE Regional Offices (TRO) boundaries resulting in reduction a of RMC's from 5 to 4; (b) re-organize DENCOM CONUS Regions along TRICARE boundaries going from 4 to 3; (c) Transform Center for Health Promotion and Preventive Medicine to a Public Health Command which will incorporate / integrate all PM and Vet capabilities in one command; (d) Continue with the stand up of a Warrior Transition Command and associated elements. The USAMEDCOM reorganization is an evolving process with timelines for implementation from concept, Army Senior Leader approval, provisional stand up and FOC.

Future Medical Command

While the MEDCOM reorganization and the Army Enterprise Initiative will provide the structure to enable the Army to be more efficient, effective and correctly focused, the probability exits that further change will be necessary to meet the demands of a changing environment. The Army is in a period of enduring conflict and will require significant medical capabilities in order to meet the demand to support the force. While the budget is always a primary influence on anything we do, decisions by the Senior Leader's of the Army or OSD could have a dramatic effect on the medical organization.

It is doubtful that the Army will make dramatic shifts to the GF MEDCOM organization so beside evolutionary changes; the reorganized MEDCOM would be expected to resemble that configuration. OSD decisions could have greater ramifications. They run the gamut from status quo, single service, more jointly staffed facilities, JTFs, sub-unified command, unified command, and defense health agency. The last three (sub-unified command, unified command, defense health agency) would mark a revolutionary change to the way we have been organized to provide healthcare to the DoD. There are now and will continue to be proponents that specifically support one of these organizational designs but none has ever gained sufficient traction or political support to move beyond the "study or report" phase.

Some view the stand-up of JTF CapMed as a precursor to a Unified Medical Command but the environment that led to standing up the JTF was not motivated by the thought of an eventual UMC. Costs, the hope for efficiencies, focus, visibility (NCR) and the WRAMC issue were the primary drivers that led to a JTF. While this could ultimately lead to an overarching organization charged with DoD healthcare (sub-unified command, unified command, defense health agency), I see no large scale movement within the DoD or Congress to make any of these a reality.

One scenario that can be envisioned is based on escalating costs or OSD/ COCOM/ JS/ Service Senior Leaders growing frustration with having to continually deal with medical issues across multiple organizations. A scenario could play out that results in all medical activities coming under a single organizational structure. That single structure could easily be a Health Agency (DHA) framework using the Defense Logistics Institute (DLA) Defense as a model.

Politically, this design might have the greatest support and would be fairly easy to transition to a FHA that would include the medical piece of the VA. The most difficult piece to execute is the deployment piece for the respective Services. Additionally, the non-DHP and structure would require significant work to ensure that all equities are adequately addressed. If this structure were to gain traction, the MEDCOM reorganization as envisioned, appears to be appropriately designed for smooth transition into a DHA. However, if there are structural pieces to a proposed DHA that the Army/MEDCOM would want to either be postured to lead or heavily influence, they should be specifically be put in place now so when/if a DHA becomes a reality, the MEDCOM is prepared.

What Existing Studies Have Been Completed On Mil-Med Reorganization?

Military-Medical Reorganization is a topic of frequent debate fueled by multiple collaborative projects and government reports. Most efforts focus on the anticipated shift to a more unified command structure; however, several also project changes 20 year out. This paper reviews major studies that looked into the governance of military healthcare and how it would evolve to leverage unique service capabilities and align leadership and resources to create synergy. Military and other government agency studies were reviewed, and the most significant were listed from the earliest to the most current.

While many articles have been written on the subject, the following are key references and worthy of study prior to projecting future military medical reorganization:

- U.S. Army Medical Reorganization Volume 1. TF Aesculapius Jan 93- Jun 95
- Congressional Budget Office report titled Restructuring Military Medical Care, July 95
- MHSS 2020- Envisioning Tomorrow to focus Today's Resources
- MHS 2025- Toward a New Enterprise
- RAND 2001
- Quadrennial Defense Review titled Roadmap for Medical Transformation
- GAO Report to Congressional Committees titled Defense Health Care
- Task Force on the Future of Military Health Care Report
- The Joint Operating Environment- 2008
- Military Health System Strategic Plan

"Beyond Jointness": A Situational Scenario

A combination of scenarios, a surge in urbanization, water/food/energy shortages, pandemics, global economic collapse, civil disturbances, terrorism and domestic/international crises, may strain the public and private healthcare delivery systems to a critical point of failure. If the "reset button" is pushed to stabilize a failed US healthcare system, should the JMHS take the lead and embrace "beyond jointness"?

- **Pro –** Military leadership is in position to quickly mobilize basic healthcare services to refugees/DPs in coordination with FEMA/NGOs on short term basis. Expansion of JMHS to oversee and sustain a national healthcare mission is possible with comprehensive consolidation of other government health services. Military beneficiary healthcare is a vehicle

to train the medical force…expansion of military GME to society-at-large benefits trainees and society. Undoubtedly, resources can be coordinated and consolidated at a savings.

- **Con –** JMHS expertise is deployment healthcare from battlefield to rehabilitation. Readiness and competency to prevent, evacuate, and treat tropical diseases and battle injuries are unique to military medicine (CBRNE and tropical/indigenous diseases). Applying exceptional measures to rehabilitate injured Soldiers (high tech PT/OT, prostheses, eye refraction surgery, and limb/face transplants-all efforts to RTD injured personnel) are not applicable to civilian population. JMHS projects healthcare overseas as an instrument of national power (OOTW, SOSO, DIME). Mission creep is a hazard to primary mission.

Are benefits of the consolidated system the same for all beneficiaries, citizens, service members, and prisoners? Do we increase benefits to level of military or decrease military to level of Medicare with possible denial of treatment? Are Commanders willing to give up control of JMHS? Are citizens willing to pay for current system of Medicare for all citizens, or accept a "defined" benefit based on a fraction of GNP?

Recommendations for the AMEDD in the Near to Intermediate Future:

1. Reorganize AMEDD to drive integration toward joint governance & organizational structure that can link to larger Federal efforts.
    A. Develop C2 capabilities that are joint capable informed by resourcing realities.
2. Engage sister services and DoD leadership to create a Joint Medical Force to project healthcare as a national instrument of strategic influence.
3. Leader Development
    A. Futures seminar for all TWI, ILE and SSC selectees prior to academic year(s). Include concept in ODPs.
    B. Continue cross-pollination with sister services, other Federal Departments and civilian academic institutions- increase volume and intensity of joint assignment.
    C. Explicitly address cultural barriers to achieving meaningful unity of command and effort.
4. Develop mutually beneficial contract relationships with civilian academic institutions.

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AMEDD Futures 2039 Virtual Work Group 2 Report

The 2039 Health Care Model

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The 2039 Health Care Model: Introduction and Summary of Key Trends

Virtual Working Group 2 worked on five questions pertaining to the 2039 Health Care Model for the AMEDD. These themes were: (1) How will patients be empowered? (2) What could an integrated federal health system look like? (3) Where will health services be delivered? (4) Will prevention and treatment of "pre-disease" be a major component of medicine? and (5) How will the health of an individual be coordinated and integrated? Participants did research and developed forecasts of what these issues would be like in the AMEDD in 2039. They also made recommendations about what the AMEDD should do to prepare for or to help create these future possibilities.

Key trends from all five topics include:

1. Patients will be empowered to manage their own health with the assistance of technologies.

2. Military Medicine evolves from independent Services to Joint efforts to a single Military Health Service to a single Federal Health Service.

3. Health care progressively shifts from the hospital to information technology supported "health homes" to self-care and virtual care to the addition of auto-care. With each shift the hospital will be less important.

4. There will be a shift from reactive to prospective medicine that is predictive, preventive, personalized and participatory in nature.

5. Health care delivery will be coordinated and integrated with shared obligations and the individual ultimately being responsible for his/her health.

6. Technology advances such as knowledge systems, avatar assistants, biomonitoring, nanomedicine and robotics will dramatically change and improve the delivery of health care.

7. Beneficiary care will likely shift to an effective national health system for all Americans.

8. AMEDD will have the capability to create "superhealthy" soldiers resilient to the stresses of combat.

Most of these themes were included in several reports. The concept of medical care is shifting to prevention and prospective intervention to prevent morbidity rather than treating established diseases. Knowledge systems, biotechnology, nanotechnology and robotics will all be important components in future advances in the management of health, even on the battlefield. The delivery of care will change to more integrated and cost effective shared systems. AMEDD has the structure, talent and leadership to not only embrace these changes, but to be a leader in creating nation's health system of 2039.

Summaries of Individual Research Reports

Patient Empowerment

In 2039 patients will no longer be recipients of care; they will be the driver of their health care. They will receive the majority of the information about their health from an electronic dashboard which displays data captured from various biosensors and integrated by a knowledge technology system. Patients will receive recommendations on healthy behaviors and how to mitigate or eliminate health risks. The health system and society will provide a lot of support and incentives to succeed, but actual health outcomes will be the domain of each patient who is ultimately accountable and responsible. The paper describes how IT Health Clinics with supporting technologies will be a centerpiece of future health care for individuals and communities.

An Integrated Federal Health System

Several signposts point to efforts to integrate information systems, resources, and continuity of care among various federal health entities. Likewise, Joint warfighting CINCs, BRAC initiatives, a single military electronic record, a single defense health budget, and the Joint Medical Command concept study are signs of the possibility of consolidation of four Service medical departments into a single entity in the future. In many ways this makes sense for seamless health care, interoperable systems, personnel serving in joint environments, and tremendous savings from shared services and elimination of redundancies. The present trajectory suggests a single Military Medical Department and health delivery system with personnel assigned to Service specific operational billets.

Does it make sense to go beyond the military to a single Federal Health System? What would be included and what would be the benefits. This paper explores an integrated Federal Health Care System (MHCS) combining the military and Department of Veterans Administration to provide seamless life-long care for service members. It could be expanded to include the Indian Health Service, Public Health Service and even all federal programs such as Medicare and the Federal Employees Health Benefits Program.

Where will health services be delivered in 2039?

Rather than starting with facilities, this paper looks at future evolution of the delivery of health services and then asks what will be the roles of existing clinics and hospitals. Over the past 30 years a lot of health care has shifted from the hospital to ambulatory care venues such as multispecialty clinics, imaging centers, and ambulatory surgery. There currently is a big drive for integrated primary care in the Patient Centered or Advanced Medical Home which will evolve into an Information Technology Enabled Health Home. There is a concurrent trend for using information technologies and biomonitoring to empower individuals to self manage their health and chronic diseases at home. With growing dependence on the Internet and move into Second Life, virtual reality in cyberspace will be the medium of choice for health services. Another technological advance is sensors and devices that can be implanted to automatically monitor a disease such as diabetes and continuously administer insulin to control it. Nanotechnology, while in its infancy, is rapidly progressing and futurists imagine the time when nanobots circulate within the body to detect

diseases, repair cells and eliminate harmful pathogens. These technical advances will communicate to an intelligent digital agent monitoring and controlling health efforts with guidance from health providers on our behalf. The system may interface with us as the Health Advocate Avatar.

What will be the future role of ambulatory centers and hospitals when we have evolved health homes, virtual self-care and auto-care? This is the challenge for AMEDD facilities planners.

Pre-Disease and Disease Management

This paper looks at the future of prevention in the age of prospective medicine, which is characterized as "Predictive, Preventive, Personalized and Participatory." Advances in biotechnology are leading to an understanding of genetic, protein, metabolic and regulatory pathway changes underlying the development of diseases or required to maintain health. Parallel advances in biomonitoring are creating clever ways to detect subtle early changes of predisposition to disease, and leading to "pre-disease," and asymptomatic early disease. With accurate prediction of risk, specific interventions such as behavior change, therapies to nudge cells back to normalcy, or specific treatments for pre- or early disease can be undertaken.

This is a fundamental change in health care delivery away from reactive treatment of established disease to a proactive focus on wellness with active patient participation from the beginning. State of the art Health Risk Assessment is a key component. Management requires different skills to understand and predict risk, to effectively relate to patients in creating behavior changes, and to gently nudge the affected cells back to normalcy rather than aggressively attack a disease. This paper describes what such a health system could look like in 2039.

How will the health of an individual be coordinated and integrated?

One of the biggest shortfalls or our current fragmented health care system is a lack of integration and coordination so that a multitude of independent providers do not coordinate their interventions and care is neglected after handoffs, such as being discharged from the hospital. Multiple studies show that this is the biggest problem in causing medical errors, the under-, over- and misuse of care, and waste.

This paper defines a system where a responsible care coordinator collaborating with care providers and the patient can ensure that the patient gets the right interventions at the right time. The effort is facilitated through electronic health records, the patient's Health Advocate Avatar, biomonitoring, and other technologies. The result is an effective system that provides the support patients need to be accountable for their health.

Recommendations

1. AMEDD develop R&D partnerships to evolve electronic health records into knowledge systems and avatars supporting integrated care and empowering patients.

2. AMEDD be a leader in developing robotics, biomonitoring, and regenerative medicine for mission centered care with dual use in peacetime care to advance technologies and maintain skills.

3. AMEDD develop the health approach of prospective medicine with active patient participation in prevention and management of pre-diseases.

4. AMEDD create a technology enabled, customer focused evolution in health delivery from the Health Home to self-care and virtual care to the addition of auto-care, and manage a concurrent shift of care venues to the most appropriate site for each stage of care.

5. AMEDD develop capacities to create "superhealthy," resilient soldiers.

6. AMEDD foster jointness and progress integration to prepare for the likely transition to a single Military Medical Service even to a single Federal Medicine System.

7. AMEDD develop the capacity to continually scan for future changes in a wide range of issues impacting health and care delivery, and pursue innovations to incorporate into world class health services.

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AMEDD Futures 2039 Virtual Work Group 3 Report:

Healthy Communities in 2039:

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Healthy Communities in 2039: Summary of Research

Healthy communities will be important to AMEDD, the Army, the military and the nation in 2039 the forecasts in this paper show. Either AMEDD does a remarkable job of getting it right, as many of the forecasts below describe, or the military follows society down the path of devolution, as an alternative forecast shows below. This report recommends steps AMEDD can take starting in 2009 to work on the positive future forecast for healthy communities in this report.

What will Army communities look like in 2039?

State-of-the-art garrisons that surround Soldiers with healthy families who feel they belong makes the Army a work destination of choice in America. Overcoming silos the Army command turned to social networks and avatars that link global expertise and community to individual Soldiers and their family members.

Social networking as the source of force protection:

Web-based connections help Army commanders deploy community coalitions to address suicide, alcohol, tobacco and other risky behaviors. Holistic wellness plans organize strategies for AMEDD communities. Civilian populations in the surrounding community also benefit and learn to adopt Army approaches.

Communities of caring pay dividends:

Avatars provide easy access to health care that strengthens the Army, improves morale and makes recruitment easier. The dividends come from community wellness model that diverts beneficiaries from emergency rooms and clinics.

Recycling is the Army's greatest resource:

The Army green ethos attracts top-quality people into Army service and helps retain them beyond ten years. Recycling generates funds for Army posts, and becomes the strategy for everything from material and energy to genetics and missions.

Psychological body armor is a "go to war" and "man the home front" necessity:

The war-fighters of 2039 have "the psychological body armor" of a healthy body, mental resilience, and spiritual hardiness assessed before, during and after deployment. Healthy community relationships foster self-esteem that wraps individuals and teams in the Total Army Family.

Alternative forecast for Army communities:

In America the basics of life are at risk as dependency, social isolation and mistrust brings a poor quality of life to communities with high rates of destructive behavior. Military medical care has huge increases in expenditure as families with the poorest health are forced into military service for the benefits. The pool of Army recruits is at an all time low in 2039.

What Will Army Communities Look Like in 2039?

Thirty years from this day we will look out a window and rejoice in achievements the Army has made by maximizing recycling capabilities for both human and natural resources. Resulting cost avoidance garnered funds for state-of-the-art garrison facilities. Since recruiting new Soldiers and retaining quality Soldiers is known to be most effective when efforts include individuals along with others they considered as social capital, garrison surroundings attract 'families' with their physical appearance, valued attributes and feelings of belongingness. Thus the Army is the lifestyle and work destination of choice for many Americans.

The AMEDD will have made its Army legacy by stepping up first to eliminate the command and control silos separating military health care, military duty and leisure life. In 2039 we can clearly see that the development and maintenance of optimal wellbeing and performance is dictated by processes that take place in a social and ecological environment. The social networks built in physical and virtual Army communities and owned by Senior Commanders and Community Coalitions have proven to be the perfect milieu for motivating personal and communal accountability toward healthy living, emotional resilience, and healthy environments. Because avatars empower the Army family to embrace self care as their preferred way to consume health care, a significant proportion of military health care assets have moved from provision of one-on-one primary care of individuals to being formal and informal healthwise experts connecting Army communities with individual members, stakeholders and civilian communities. In this capacity the health worker's role is to diagnose, treat and deter community threats and to consort with social networks toward community and community member wellness. The task is daunting yet rewarding because we know that in the Army scheme social cohesiveness is no less important than tactical cohesiveness, just as social health is no less vital than mind-body-spiritual health.

Thirty years from this day we will look back and wonder why we never noticed that functional differences in longevity are the result of life-long exposure to the environment and that short-term biochemical reactions and long-term wear and tear on everybody molecule affects each of us differently depending on our genetic vulnerability and our sensitivity to environmental stimuli. We will wonder how we ever bought into a reductionist health care prospective in which isolated individual therapeutics, i.e. "the golden pill" were the best cure we could offer our patients. In hind sight we will ask ourselves how we ever made an accurate diagnosis and treatment plan without the integrated databases we now rely on. Each stores millions of data bites for every human over their lifetime. The avatars move health data from numbers to knowledge to know-how and provide limitless health related services to military beneficiaries in the convenience of their home and community.

The AMEDD's long standing American legacy began 30 years ago when we wrapped the Total Army Family in education and services to facilitated readiness and rebound from missions and mission related separations. As a result we fabricated millions of Americans with psychological body armor including a capacity toward healthy bodies, mental resilience and spiritual hardiness. Although the initial impetus was Army mission accomplishment, the impact has been measureable nationwide.

Forecasts for Army Communities in 2039

Social Networking as the Source of Force Protection

In 2039 Army communities will make social networking tools the venue for ensuring the holistic wellness of the Army population. Social networks were perfected by the AMEDD over three decades to link the individual with the base community and a global network of compassionate experts who effectively work on health dynamics. Army leadership has taken an aggressive stance to having web-based connections improve healthy lifestyles and disease prevention by designing healthy communities. Commanders will be trained in human performance optimization and will be responsible for protecting and maintaining the health and well being of the total Army family. Rather than stovepiped Commands reacting to individuals' work performance, injuries and illnesses, Commanders will employ Army Community Coalitions, including a transdisciplinary membership, to integrate medical, tactical and garrison assets, remove redundancies, maximize mission effectiveness, reduce costs, and bolster life-long commitment of Army Soldiers and family members. Money previously spent to prevent individual risky behaviors such as suicide, tobacco, drug, alcohol, etc, will be allocated towards a holistic wellness plan that strategically identifies community weaknesses then leverages evidence-based resources to mitigate them before community members are impacted. We now know that a Soldier is only as strong as his family and a family is only as strong as its community, therefore the Army Community Coalitions allocate resources based on installation level requirements needed to exploit Army community functioning at the highest level of health. Since Army communities are preeminent, and Army Community Coalitions are internationally recognized for their successes, there is a greater need for partnering with civilian communities to share community wellness expertise as well and other Army assets when health disparities impact enlistment of quality recruits or retention of quality Soldiers.

Communities of Caring Pay Dividends

Interactive and culturally competent avatar units conveniently located in common public areas are used to maximize and track individual as well as community health and wellness. The resulting frequent and easy access to both treatment and preventive health care combined with need to know education, self-care advice and community support has raised physical, behavioral and social barometers for the Army and the Army family. Caring for Army beneficiaries in their community via avatar has brought about a fundamental shift from the medical home tactic of care provision with its premise of patient-centered care, to a community of caring approach.

The Army focuses on identifying and developing Soldier, family member and community strengths in order to achieve mission and manpower goals. Years of research about psycho-physiologic longevity and precursors to work productivity have induced a mind over molecules mentality. Awareness and education on positive physical and psychological health previously conducted as part of military training have been incorporated across Army family domains. From preschools to chapels to mass media, topics such as nutrition, resiliency, active lifestyle, group well-being, tactile and social group cohesiveness, and self-efficacy are taught and enforced. Consequently morale toward Army team goals and tasks is high and subsumes confidence, optimism, enthusiasm, and loyalty as well as a sense of common purpose. Diverting Army beneficiaries away from emergency rooms and outpatient clinics and implementing a continuous comprehensive community wellness model has produced dividends throughout the Army.

Recycling is the Army's Greatest Resource

Community achievements, healthy lifestyle values and living Army green ethos lure top-quality individuals and families into Army service and retain them beyond their ten-year commitments. Ever since the Army discovered a novel conservation plan which maximizes recycling of its national resources (such as land, water, and minerals) and "recycling" its Soldiers by promoting healthy lifestyles for a renewable, more resilient, and sustainable battle force, the Army community has reset the bar for everyday living style and is the work destination of choice for many Americans.

Promoting an Army Green standard encouraged the development of a force capable of recycling quickly through missions, maximizing forces genetic (inherent) resources and influencing resiliency via environmental wellness. Garrison Recycling Centers recycle all post waste and generate operational funds for garrison, MWR, post scholarships and other community valued activities. This promotes fiscal responsibilities of garrison citizens and makes it an honor for them to live on post. In return for dropping off recycling materials, participants receive moderate credit toward their maintenance bills (electric/water/ sewage) and recognition by the Garrison commander for promotion points. Now off the grid, Army posts are self-sustainable. Solar thermal microwave generated energy works 24 hours daily and is highly reliable as it is collected in space without impact on ground weather.

Strong evidence supporting lifestyle as an effective recruiting incentive has expanded the physical fitness gap between civilian and military communities. Garrison has built state-of-the-art recreational facilities and free outdoor activities to promote healthy active living and reduce stress. Army community members scan their CAC cards to receive credit points for using exercise facilities and receive bonus points for pay-for-use activities or electronic indoor aerobic games or movies. Army Physical Fitness Tests were replaced by aerobic and muscle virtual trainer machines that are used for exercise as well as measurement of aerobic capacity, muscle strength and allostasis (the body's ability to respond appropriately to internal and external stressors). Physical fitness is no longer a cross sectional evaluation but is quantified on a daily basis during PT on the virtual trainer machines. Family members, retirees and Army civilian employees may participate in the Army fitness program. Promotion points are given to Soldiers with top quartile fitness scores. Fitness machines are operated on a points system—for every exercise session meeting virtual trainer goals, points are rewarded toward gifts or time off. This all helps to reduce family stress while promoting

aerobic activities and significantly decreases usage rates for medical care at the military treatment facilities.

Psychological Body Armor is a "Go to War" and "Man the Home Front" Necessity

Appraisals of past performance before, during and after deployment reinforce the premise that war-fighters must have "Psychological Body Armor" including a healthy body, mental resilience, and spiritual hardiness in order to face the stress and hazards of the battle field and function well in garrison. In 2039 Army communities build and maintain relationships that foster health, resiliency and hardiness. These community structures produce a strong sense of *esprit de corp* and membership for the Soldiers, families and retirees. This feeling of belongingness built upon community relationships as well as individual relationships defeats feelings of personal aloneness, fosters self esteem and worthiness as a part of the team, and maximizes the balance between required/ethical killing and healthy relationships outside of the war-fighting structure.

Integrated transdisciplinary subject matter experts work with Senior Commanders and Community Coalitions to deploy holistic services that incorporate mission readiness and reset needs into warrior and non-warrior training. Specifically, the Army has enhanced the well-being of the Total Army Family by wrapping them in education and services that facilitate readiness and rebound from traumatic mission separations and events to ensure these transitions do not results in individual, family, community or societal failures. The building of psychological body armor begins for all members of the Army family on day one entrance into the Army. Community members are screened by avatars for risk factors and targeted training or evidence based solutions are implemented immediately. Consequently, psychological body armor has created the ultimate safety net made up of relationships, sense of community and mind-body-spirit competency that enables Soldiers to transcend conflict and develop problem solving modalities that result in long term stability and mission accomplishment.

Alternative Forecast for Army Communities

American society is sliding down Maslow's hierarchy of needs. Belonging, esteem, and self actualization are losing out to concerns about safety and security. The basics of life are no longer a given. Water supplies are dangerously over-tapped. Communities rely on huge pipelines, desalinization plants and other expensive solutions that take funding from basic services. Food supplies are increasingly threatened. Quality housing is unaffordable. Cultural and recreational programs have been eliminated as more pressing needs consume limited resources. Transportation systems, utilities, schools, and public buildings are in disrepair. Military communities are increasingly reliant on civilian communities that are frequently on life support themselves. Community ability to produce what is needed and perform community functions with a general level of ability and efficiency is in peril. Cooperation between installation leaders and local civilian leaders is strained. Community pride, self reliance, and cooperation have been replaced by dependency, social isolation, and mistrust. The result of failing community capacity has had extraordinary impact on the Army family as evidenced by a generally poor quality of life and high rates of destructive behavior, crime, physical and mental illness, and death. Indeed, without the support of communities and society, it is almost impossible to keep a qualified Soldier in uniform in 2039.

With the increasing demands of work and financial survival, fewer citizens have time for personal or family health concerns. Primary care is available for the general population but advanced care is rationed and denied to patients who do not meet government-approved standards for age and health status. People with poor health behaviors are either denied care or forced to pay steep premiums. This has resulted in huge increases in military health care expenditures as families with the poorest health are forced into military service in order to receive benefits to cover medical care that is uncompensated in the civilian sector. Meanwhile, health promotion and behavioral health programs are cut because they lack "bang for the buck."

The media, in an effort to be noticed in a crowded market, celebrates deviant behavior and attacks traditional values and institutions. This further reduces the strength and vitality of traditional cornerstones of society. The nuclear family is fading into obscurity. Social safety nets that have been around for generations are fraying badly and people are feeling increasingly isolated. American education is now in full crisis. Schools are in such poor shape that test scores in parts of the country parallel the developing world and dropout rates are at epidemic levels. Illiteracy is up and an increasing proportion of the population does not speak English. The pool of potential Army recruits is at an all time low and those who want to join require a large upfront Army investment before they are physically, mentally and socially capable of servicing.

Recommendations for the AMEDD

Reallocate AMEDD resources to orchestrate community-based social networks.

- Purposively construct healthwise nodes (facilitators/actors) and fabricate productive ties (relationships).
- Work with Senior Commanders to develop community coalitions and well being strategic plans for the Total Army Family.
- Incrementally reallocate AMEDD assets to community coalitions.
- Shift the health care epitome to include physical environments, recreational opportunities, cultural activities, and social support systems.

Invest in community enhancement and evaluation technology.

- Develop technology to longitudinally monitor physical and mental wellness metrics.
- Build the capacities to real-time assess, modify, promote and record health information for individuals, and to aggregate it to the level of the family, the community and garrison.
- Create software capable of using data to identify community risk threshold levels.
- Authorize work to develop community based health assessment and maintenance technology. This technology should be capable of identifying and developing strengths and weaknesses even at the molecular level and responding with evidence based solutions.
- Develop technology that will convert the Army Physical Fitness Test from a cross sectional evaluation to a continuous assessment.

Begin incentivizing the Total Army Family toward networking, healthy lifestyles, conserving and recycling.

- Reward positive lifestyle behaviors such as exercise, community activities, and mental well being.
- Use technology to immediately link healthy behavior to community valued rewards.
- Increase provider and Medical Command competencies to provide primary care beyond the level of the individual.
- Empower military beneficiary self care capacities.
- Develop a community dashboard or report card with meaningful metrics and a capacity to measure and report community level data over time.

Incorporate awareness and training about positive social, physical and psychological health across all Army family domains.

- Domains include preschools, chapels, mass media, etc.
- Topics include nutrition, resiliency, active lifestyle, group well-being, tactical and social group cohesiveness, self-efficacy, etc.
- While community coalitions to promote wellness are being developed, incorporate holistic health promotion medical assets into the brigade or battalion structures.

Partner with Senior Army Commanders and civilian programs to network health and lifestyle resources.

- Build reciprocal relationships with communities outside the gate to keep kids in school, improve their level of fitness, and develop character and citizenship.
- Develop and implement programs to educate and motivate Commanders and community leaders to understand the health and well-being of their constituencies.
- Shift accountability for human performance optimization as well as protecting and maintaining health and well being of the total Army family to Commanders.
- Partner with Garrison Commanders to develop novel conservation plans to maximize recycling of natural resources.

Increase support for research related to community-based health optimization and social networking.

1. Seek or build assets to examine and maximize social networks and community coalition performance.
2. Fund research, collaboration, design and production of education programs to increase psychological body armor for beneficiaries of all ages.
3. Build in program evaluation studies to measure the effectiveness of community enhancement endeavors.

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Institute for Alternative Futures

AMEDD Futures 2039 Virtual Work Group 4 Report:

The Optimization of Health in 2039 Achieved Through Science and Technology

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May 2009

Explore. Aspire. Create. Evolve.

The Optimization of Health is Achieved Through Science and Technology: Summary of Research

The rapid pace of developments in science and technology described below will help drive a health system transformation between now and 2039 away from a treatment of disease and injury model to one emphasizing prevention, regeneration and enhancement of health and performance.

Regenerative Medicine

Within 10 years we will be able to seamlessly heal most combat wounds and eliminate scars by inhibiting tissue fibrosis, grow organ and tissue patches to facilitate surgical repair of damaged or diseased body parts, and induce bone and cartilage to grow in vivo using bioactive frameworks that degrade once regrowth is complete. Within 20 years we will be able to regenerate digits and induce moderately damaged organs to repair themselves in vivo. Badly damaged organs will be regrown and transplanted. Non-immunogenic organs like the heart, kidney, lung and liver will be routinely grown and stockpiled for emergencies. Within 30 years the complex problem of in vivo limb regrowth is likely to be solved. Additionally, the scope of Regenerative Medicine will expand from "cure" to "prevention." It will be common practice to receive personally tailored intravenous treatments that activate regenerative cellular activities to maintain health and vigor.

Medical Education and Training

Medical education programs and curriculum will be created and maintained through hybrid-wikis and virtual campuses that facilitate expert collaboration among medical professionals around the globe to assist in shaping instruction with the latest lessons learned. Career-long Avatar Assisted Learning will guide new recruits to prepare for each next level of training as they progress through their studies, assessing each new scheduled course and systematically sequencing previously unlearned lessons for maximum pre-course development. Through enhancements in S&T, students are trained on mental skill development to enhance their reading comprehension, critical thinking strategies, and time management skills. Brain-computer interfaces use dynamic, learning biofeedback to instill resilience and all maximum results in courses. Personal Learning Devices (PLDs) will serve as a single textbook for all courses, wirelessly downloading continuously updated multimedia instructional material, including interactive holograms allowing realistic visualization of the anatomy and systems under study. Advanced Medical Simulation will improve the realism of instruction. New advances in simulated tissues and multi-texture human systems will allow realistic training in near-live tissue training. Human and animal mannequins not only replicate flesh-like tissues, but also fluids, sounds, and smells of real patients, incorporating greatly enhanced feedback sensors. Personal Avatars and integrated medical databases will coach individuals in prevention and health promotion, provide personalized health advice through dynamic, learning kiosks that provide relevant, targeted, disease prevention instruction with the backing of the most recent medical science.

Performance Enhancement

A race for biomedical, genetic and cognitive enhancement could well become the 21st century equivalent of the space race in the previous century. Developments in biology and neuroscience will lead to Disruptive Technologies that transform capabilities related to fatigue, cognitive degradation and enhancement, "wear and tear" on body systems, tissue and organ repair, immune response, and the aging process itself. Avatars will greatly enhance capabilities for continuous learning, teamwork, rigorous analysis, and "big picture" thinking. The level of computing technology used in creating Avatars will also be used in creating new generations of advanced prosthetics and strength-enhancing exoskeletons.

Nano-Bio-Robo for Far-Forward Diagnosis and Treatment of Casualties

Nano, bio and robot technology may radically improve capabilities for extending the "Golden Hour" of casualty survival. Potential advances in field diagnostics include internal diagnostics using a maneuverable nano-camera swallowed as a pill and nanoshells capable of detecting injured blood vessel walls; hand-held medical scanners utilizing near-infrared spectroscopy, ultrasound and EEG imaging; lab-on-a-stick technology for chemical and biological assays; and implantable metabolic sensors inserted prior to injury. Examples from among many potential advances in field treatment include nanoparticles to decrease inflammation in wound healing and burn injury and nanosystems to detect injured blood vessel walls and apply payloads of vascular glue, chemicals or heat to stop internal bleeding. Potential breakthroughs in resuscitative care include full development of the Life Support for Trauma and Transport (LSTAT) mobile trauma pods and reversible metabolic hibernation without tissue damage delivered to serious casualties until extraction and transport to a trauma medical center is complete.

Patient Transport

As forecast above, Life Support for Trauma and Transport (LSTAT) systems will be widely utilized. In addition, well armored Combat Medical Vehicles (CMDs) made with advanced lightweight materials will provide transportation and advanced trauma life support to critically injured soldiers. MEDEVAC air transport of critically injured soldiers from near the battlefield to the hospital will be possible nearly anywhere in the world. Because the potential need for medically trained flight crew may be large in future conflicts, a broader range of AMEDD personnel (i.e. nurses) should be utilized as flight crew team members. Insuring that a robust aeromedical evacuation system responsive to Army needs is available wherever soldiers are being injured is a top priority.

Research Organization for Flexibility and Responsiveness

The recent conflicts in Afghanistan and Iraq have created new medical challenges such as traumatic brain injury that clearly illustrate the necessity of rapid and relevant response by the military science and technology community to the changing needs of the Soldier in the battlefield. To assure this

responsiveness into the future AMEDD needs strong leaders who are committed to the needs of Soldiers. Laboratory commanders need sufficient discretionary funding to quickly create special programs to address emerging needs. The problem of having to use research dollars within a certain timeframe needs to be solved to avoid waste and encourage the creation of reserves available to engage quickly and strongly with emerging health issues. Closer relationships need to be developed with NIH and other federally funded laboratories to bring greater resources to bear on emerging issues. And communication needs to be increased and regularized between scientific officers and combat commanders, military hospitals, and an "Early Signals Network of NCOs in order to rapidly identify new areas where medical science can assist the warfighter.

The following section contains one page summaries of the group's research on each of the above topics.

Regenerative Medicine - COL Scott Goodrich

Forecasts for regenerative medicine in 2019, 2029 and 2039

- **2019.** The next 10 years will see major advances in the generation and regeneration of simple tissues. Our knowledge of growth factors and growth inhibitors will allow us to seamlessly heal most combat wounds and eliminate scars by inhibiting tissue fibrosis. If wound damage is too extensive, skin will be grown in vitro and grafted. We will also perfect our ability to grow organ and tissue patches to facilitate surgical repair of damaged or diseased body parts and will be able to do this at all of our Medical Centers. Bone and cartilage will be induced to grow in vivo using bioactive frameworks that degrade once regrowth is complete. We will regrow shattered bones and rebuild broken faces.

- **2029.** By 2029 AFIRMS original 5 goals will be fully realized. Digits will be fully regenerated in vivo, but full limb amputations will still require in vitro reconstruction and transplantation. Despite our new expertise with regrowing nerves, muscles, blood vessels, and bone, we will not yet have the ability to stimulate the body to regenerate complete organized limbs. Moderately damaged or diseased organs will be chemically induced to repair themselves in vivo but organs too badly damaged to repair will be regrown at the AMEDD Tissue and Transplant Center (ATTC) and then transplanted. Non-immunogenic organs like the heart, kidney, lung, and liver will be routinely grown at the ATTC and maintained in our Tissue and Organ Stockpile (TOS) for emergencies. This stockpile will also furnish our forward surgical teams with replacement parts, similar to the way we manage whole blood. Spinal cord injuries will be completely repairable.

- **2039:** Military medicine and the AMEDD will be transformed. The complex problem of in vivo limb regrowth will be solved. If a Soldier or any military beneficiary survives an initial traumatic wounding, it is highly unlikely that they will die. Critically wounded patients will immediately be placed into a semi-suspended state (another new medical advance) and maintained on life support while their injured body parts are repaired or replaced. Additionally, the scope of Regenerative Medicine will expand from "cure" to "prevention." It will be

common practice to receive personally tailored preventive intravenous treatments that activate regenerative cellular activities within your body to maintain you at your baseline state of health and vigor. Many of our inpatient wards will be converted to same-day Tissue Repair Suites, where teams of specialists and interventional radiologists deliver bio-active compounds to damaged, diseased, or failing tissues and organs with pin-point accuracy, normally returning them to full health and function within two to three weeks time.

Implications/Recommendations for AMEDD

- Funding for the AFIRM collaboration and other similar joint endeavors should continue at current or increased levels. Setting and funding our own priorities is critical because if we rely on the private sector to provide solutions, then consumer economics will prioritize them for us.

- The AMEDD should introduce Regenerative Medicine forecasts into Healthcare Facilities Planning. It is clear that as this science develops, specialized laboratories and transplant capabilities will need to be incorporated into mid-term facilities design.

- To speed final approval of Regenerative Medicine products, the AMEDD should promote its capabilities to conduct human trials of early applications. AMEDD Medical Centers, most notably the Burn Center at Brooke Army Medical Center, are already well positioned to support such studies.

Medical Education and Training – COL Randall G. Anderson

Forecasts for Medical Education and Training in 2039

1. **Personalized medical education and training for each individual**
    a. Educational programs and their curriculum are created and maintained through hybrid-wikis and virtual campuses.
    b. This tool for subject matter expert collaboration allows medical professionals around the globe, even those on the battlefield, to assist in shaping the instruction with the latest lessons learned.
    c. Advances in Science & Technology facilitates student training on mental skill development to enhance their reading comprehension, critical thinking strategies, and time management skills. Through brain-computer interfaces using dynamic, learning biofeedback, resilience is instilled to achieve maximum results in courses.

2. **Career-long Avatar Assisted Learning**
    a. An avatar guides the new recruits to prepare for the next level of training as they progress through their basic training and advanced studies.
    b. The education avatar remains engaged with Service members throughout their career, updating them on new medical findings and ensuring they are aware of the latest

information appropriate to their profession. The avatar has the ability to contact its "owner" through all electronic means of communication when medical emergencies occur (i.e. a pandemic outbreak) and advises them on appropriate actions.

3. **Enhanced Learning Devices**
    a. Development of Personal Learning Devices (PLDs) will serve as a single "textbook" for all courses, able to wirelessly download text, audio, video, and reference materials for the most updated curriculum and instruction.
    b. Medical instruction will be augmented with animated digital holograms, providing three-dimensional diagrams of the entire human anatomy. Interactive holograms will allow realistic visualization of the anatomy and systems under study, with the ability to manipulate the parts for a better understanding,

4. **Medical Simulation in the "Classroom"**
    a. More responsive, situationally aware models will improve the realism of the increased human-computer interaction resulting in more effective training and reduced mental barriers to working with programmed machines.
    b. New advances in simulated tissues and multi-texture human systems will allow realistic training in near-live tissue training. Human and animal mannequins not only replicate flesh-like tissues, but also fluids, sounds, and smells of real patients, incorporating greatly enhanced feedback sensors that respond to treatment and communication from the provider.

5. **Empowerment of all Service members, Civilians, and Family Members to Have a Role in Medical Education**
    a. Emerging technologies will allow the empowerment of all individuals involved in the military mission, including civilians and family members, to build and maintain their individual health network.
    b. Through integrated medical databases and personal avatars, each person will enjoy personalized health advice with the sound backing of the most recent medical science. Health interaction "kiosks" provide remote health professional and computer-assisted testing, diagnosis and advice. These dynamic, learning platforms provide relevant, sound medical education targeted at promotion of disease prevention.

Implications/Recommendations for the AMEDD

- Continue to support ongoing education research into outcomes and competency-based training.

- Increase the information technology (IT) training and development for all medical professionals, including those that develop curriculum and provide instruction in the classroom.

- Consider ethical and legal implications and cascading effects of all new science and technology introduced in the training and education of medical professionals.

- Increase public relation campaigns to articulate the AMEDD's achievements in advanced technologies and R&D to recruit higher quality medical academic personnel.

Alternative Forecast for Medical Education and Training in 2039

1. Budget constraints and conflicting priorities will hamper the synchronization of efforts required to bring the virtual classroom to its maximum capacity.

2. Academic resistance to collaborative development of curriculum will continue to propagate outdated instruction, lacking the knowledge of lessons learned from daily practice.

3. Without proper consideration of ethical and legal implications of new science and technology introduced in medical training, medical professionals could find themselves in the middle of controversial practices and suffer a regression in accepted advances in this area.

4. Without the focus on tailored medical education to the individual learner and the establishment of mental skill development training, AMEDD personnel will continue to experience course attrition from essential medical specialties and experience delays through reclassification processes.

Enhancement of Human Performance – MAJ Robert Carter

Forecasts for Enhancement of Human Performance In 2039

1. "The race for biomedical and genetic enhancement will be for the twenty-first century what the space race was in the previous century". Advances in human biology, nutrition, bio-inspired engineering, and biomaterials will help provide better preventive medicine against combat related injuries.

2. Developments in biology and neuroscience will lead to major advances in understanding fatigue, cognitive degradation, immune response, tissue healing, and other aspects of mental/physical functioning. As a result, Disruptive Technologies that transform capabilities will emerge for enhanced human performance as well as disease prevention and injury treatment.

3. Disruptive Technologies will improve life spans and postpone disabling conditions from "diseases" and "wear and tear". *"Somewhere on planet earth lives a young child who will be the first person to live…forever." The DaVinci Institute.* Current theories which suggest that the biology of organisms follows a programmed development plan will be disproved. So called biological "errors" that play a role in the aging process and can be accelerated by environmental assaults (i.e., exposure to battlefield, gulf war syndrome, asbestos) will be decoded. Combat and military training exercises will be redesigned to have less "wear and tear" on Soldiers' minds and physical bodies.

4. We will be able to turn on/off genes (proteins) to improve survivability and repair damaged tissue. We will be able to deploy Soldiers to extreme environments (hot, cold, chemical) and remain confident that almost any damage incurred will be reversible .

5. Avatars will greatly enhance capabilities for continuous learning, teamwork, rigorous analysis, and "big picture" thinking. Avatars will serve in patient assistance, training of medical staff, and many other roles. Treatment avatars will contain millions of case reports and medical data and will have the ability to assist the physician with a medical course of action or make a diagnosis of its' own. The same intelligent computer technology that will be used in building avatars will be integrated into the next generation of prosthetics and strength-enhancing exoskeletons.

Implications/Recommendations for the AMEDD

- AMEDD should adopt a mindset of openness to change, given that medicine will transform from a treatment of disease model to one emphasizing prevention and human health enhancement. Despite powerful resistances that have slowed change, this transformation will gather speed because developments in science and technology will allow it to occur and rising health costs and population disease burdens will force it to be implemented.

- AMEDD itself, and in its interaction with the larger medical research community, should increasing focus attention on approaches to enhancing human performance. Research on resistance to fatigue and cognitive degradation is a high priority, as is research on using gene therapy, pharmaceuticals and other approaches to strengthen immune and endocrine systems in order to make our Soldiers more resistant to biological, environmental, or chemical insults.

- AMEDD should introduce Human Enhancement and Regenerative Medicine forecasts into its Healthcare Facilities Planning. As capabilities in these areas emerge, specialized laboratories and new clinics will need to be incorporated into mid-term facilities design.

- AMEDD should be an early adopter of personal health avatars.

Nanotechnology, Biotechnology, and Robotics for Far Forward Diagnosis and Treatment of Casualties in Future Warfare – Dr. Cynthia Abbott

Forecasts of Nano, Bio, Robo Capabilities in 2039

1. Potential developments in field diagnostics
    a. Internal diagnostics using a nano-scale camera swallowed as a pill – can prevent casualties from receiving multiple exploratory surgeries across the evacuation chain, as experienced in OEF and OIF campaigns
    b. Nanoshells capable of detecting injured blood vessel walls

c. Hand-held scanners utilizing near-infrared spectroscopy, ultrasound and EEG nanoscale imaging
d. Lab-on-a-stick technology derived from advances in proteomics and small molecular analysis for delivering chemical and biological assays
e. Implantable sensors inserted before injury performing continuous monitoring to detect conditions such as shock, trauma, brain injury and fatigue

2. Potential developments in treatment and delivery of therapeutic agents
    a. Nanoshell delivery of therapeutics to the point of disease or internal injury without collateral tissue damage
    b. Nanotechnology to combat internal bleeding by detecting injured blood vessel walls and applying payloads of vascular glue, chemicals or heat
    c. Precise target payload release of silver nanoparticles to decrease inflammation in wound healing and burn injury
    d. Nanoshells to activate antigens and deliver therapeutic molecules such as QS-21A to help the body's immune response to chem-bio threats
    e. First generation RoboMedics (medical robots) capable of delivering basic emergency care when evacuation teams are unable to assess casualties in sustained hostilities, inaccessible terrain and challenged air evacuation conditions

3. Potential developments for resuscitative care
    a. Full development of the Life Support for Trauma and Transport (LSTAT) high-tech mobile trauma pods with robotic arm for a camera and other devices to assess injury and the ability to inject therapeutics, clean wounds, apply blood to lab-in-the-field chips, etc.
    b. Reversible metabolic hibernation without tissue damage delivered to serious casualties until extraction and transport to trauma medical center is complete

Implications/Recommendations for the AMEDD

- Collaborate with industry, academe, NSF, NIH, DARPA and federal laboratories to integrate nano-bio-robo technologies for use in far-forward medical care into research agendas and strategic planning.

- Set shorter term priorities for AMEDD R&D efforts, e.g., lab-on-a-stick technology, robotic arm and accessories for LSTAT system.

- Sustain and integrate a Futures Cell similar to the US Army Training and Doctrine Command model with a programmed budget line to continuously facilitate/evaluate look-ahead thinking and assess implications for AMEDD

Patient Transport in 2039 – MAJ LeRoy A. Marklund, AN

Forecasts for patient transport in 2039

1. A robust aeromedical evacuation system will be available wherever soldiers are injured.

2. The border range of AMEDD personnel (i.e., nurses) will be utilized as flight crew team members on fixed and rotary wing platforms.

3. Life Support for Trauma and Transport (LSTAT) systems (a self-contained multiple-medical device stretcher aimed at providing continuous patient care fairly close to the battlefield and on through to area field hospitals) will be in general use.

4. Mobile patient wireless monitoring systems that are smaller than a cell phone will be in general use.

5. Lightweight yet well armored Combat Medical Vehicles (CMD) made of advanced materials will provide advanced trauma life support to critically injured soldiers. The CMD will allow trauma specialists, maneuvering with combat forces, to be closer to the casualty's point-of-injury and will be used for both rapid casualty evacuation and treatment. It will be provide trauma specialists with telemedicine interfaces to assist them in making diagnoses and providing medical procedures and treatments.

6. Rapid transport of critically injured soldiers from near the battlefield to the hospital will be possible anywhere in the world. Jet propulsion vehicles with both vertical & horizontal lift capabilities will be widely used as MEDEVAC aircraft.

7. A wide array of patient diagnostic capabilities will be available while in flight.

Implications and Recommendations for the AMEDD

- Assure a robust aeromedical system remains available and responsive to Army needs.
- Offer flight courses for a border range of AMEDD personnel, including nurses.
- Improve LSTAT so that it is light weight, self-contained, and has an adequate built-in power source.
- Cooperate with companies developing miniaturized wireless patient monitoring systems.
- Develop advanced lightweight materials to make a practical CMD possible.
- Develop a new generation of in-flight diagnostic testing equipment (e.g. computed tomography scan, x-ray, and serum laboratory tests).

Research Organization for Flexibility and Responsiveness -Andrea Stahl

The recent conflicts in Afghanistan and Iraq have created new medical challenges such as traumatic brain injury that clearly illustrate the necessity of a rapid and relevant response by the military science and technology community to the needs of the Soldier on the battlefield. Military research should be reorganized to rapidly "lift and shift" resource fire to address emerging medical problems. The National Institutes of Health (NIH) recently established a panel to explore mechanisms for improving the flexibility and responsiveness of the institutes. Key recommendations for improvement relevant to AMEDD included the *recruitment of outstanding leadership*, *dedicated funding* and *talented researchers*.

Forecasts for Organizational Flexibility and Responsiveness in 2039

1. The AMEDD has strong leadership and talented researchers.

2. The AMEDD has a resolute emphasis on the quality of scientific research.

3. Laboratory commanders have the ability to respond quickly to Soldiers' emerging health issues.

4. There is an ongoing communications process between scientific officers and those most aware of Soldiers' emerging health needs.

Implications/Recommendations for the AMEDD

- Select strong leaders for the AMEDD who are committed to improving responsiveness to the needs of Soldiers on the battlefield.

- Provide laboratory commanders with sufficient dedicated, consistent funding to recruit and retain inventive, talented scientists from across the country.

- Provide laboratory commanders with sufficient discretionary funding to quickly create special programs to address newly emerging needs.

- Solve the problem of having to use research dollars within a certain timeframe. This can eliminate waste, allow better planning, and encourage the creation of reserves available to engage quickly and strongly with emerging health issues.

- Develop closer relationships with NIH and other federally funded laboratories in order to assure the quality of AMEDD's research, maximize information sharing, and bring greater resources to bear on emerging health issues.

- Increase communication between scientific officers and a) combat commanders, b) military hospitals and c) an "Early Signals Network" of NCOs in order to rapidly identify emerging areas where the medical science community can assist the warfighter.

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AMEDD Futures 2039 Virtual Work Group 5
Report:

Professional Staff and Professional Roles in 2039

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Professional Staff and Professional Roles in 2039: Introduction and Summary of Key Trends

The year 2039 is certain to arrive with a host of technological advances, unpredictable cultural and political changes, and remarkable changes in the nature of warfare. Each of these will have impacts on how the AMEDD will function and will drive how it must prepare now to meet these requirements. This paper describes the future as it relates to the AMEDD professional staff and their roles in 2039. Research was conducted in five distinct areas to prepare this paper: (1) Impact of Future Military Mission Changes on Professional Tasks, (2) Factors and Forces Driving Size and Structure, (3) Factors and Forces Driving Recruiting and Retention, (4) Technology and How it Will Change Education and Training, and (5) Non-Technological Factors and Forces Driving Training Staffing for Military Medicine.

Three common themes have emerged from these research topics which will have a measureable impact on personnel requirements in 2039:

1. The first theme is the increasing importance of cultural skills and competency which will evolve out of continued globalization and the increasing involvement in international/coalition based operations.

2. The second theme is the continued exponential growth in technology and its impact on training and education as well as occupational employment of medical professionals both in fixed health care structures as well as the deployed environment.

3. Third, and certainly linked to the technological imperative above, is the expansion of functional decision-making capacity by what is now termed the Electronic Health Record (EHR). Each of these themes is detailed in the following section as well as the Future Trends and Themes Matrix.

In addition to these primary themes, a series of other new challenges and opportunities will shape the AMEDD in 2039:

- With regard to military operations, the battlefield clearly continues to present a full spectrum of operational endeavors with an increasing emphasis on non-kinetic operations supporting civil authorities (both at home and abroad) which have become the supported effort in many instances.

- As discussed above, most military operations are conducted in a coalition environment, often with US Forces not in the lead. These types of operations demand a high degree of diplomatic skill from AMEDD leaders and mental agility to move from combat to humanitarian support within the same operation.

- The evolution of healthcare has taken a marked turn toward preventive care focused on increasing the productive work span of most professional. Additionally the art of

predictive medicine offers opportunities in both patient care and professional recruiting. People will be able to work much later in life, and the standard 20-30 year career will expand so that qualified personnel might stay on active duty until the age of 70. This will reduce recruiting. Also new career paths will be designed for useful roles of senior members while protecting career progression of younger personnel.

- Collectively, the impact of these forces on personnel will be dramatic. Military medical personnel will continue to be among the most highly trained and skilled health care professionals in the world. They will be the recognized subject matter experts in both high technology healthcare (e.g. robotics, telesurgery, and a vast array of medical informatics) and high quality care (as measured by phenomenal outcomes in wellness care for Soldiers).

- One significant evolution in AMEDD technology is the marked improvement in technology to support the delivery of predictive and preventive medicine. These skills and opportunities make military medical service a highly sought after profession.

- Early screening with predictive medicine techniques, as early as childhood, will also significantly change how these professionals are trained and developed, including careful shaping and development of future medical professionals from a very early age.

- Finally, due to increased globalization and a resulting integration of significant numbers of foreign trained medical professionals into AMEDD, these professionals will demonstrate a very high level of cultural competency in delivery of health care as well as in leadership roles while deployed. This global expertise optimizes their ability to execute the complex public health missions that the increasingly urban centered world requires.

In summary, while AMEDD professionals retain a high standing in the medical profession, many internal and external forces will shape what the profession looks like in 2039.

Summaries of Individual Research Reports

Impact of Future Military Mission Changes (Or Non-Changes) on Professionals and Professional Tasks for Military Medicine in 2039 - LTC James Davidson

It is very likely that over the next 30 years US Forces will face many challenges and threats covering the entire spectrum of conflict including: regular and irregular wars, relief missions, future sustained engagements in crisis areas for our national interests, as well as support of coalitions. We should look now at how these missions may impact professionals and professional tasks for military medicine, and find ways to promote flexibility, resiliency and innovation in responding to these challenges.

Humanitarian:

Tsunamis, typhoons, hurricanes, tornadoes, earthquakes and other natural catastrophes will continue to require military assistance. Global disease threats such as a flu pandemic and public health challenges associated with the increased number of mega-cities will also involve military medical action. These tasks will require working in coalitions using cultural knowledge, expertise in unusual diseases, preventative medicine, and environmental science, besides traditional peacetime and combat skills.

Support of Other Countries:

The JOE 2008 (Joint Operating Environment) states that in a globalized world of great nations, the United States may not always have to take the lead in handling the regional troubles that will arise, but play a cooperative or supporting role in military operations around the world. The skills of a diplomat in working with other people and military organizations from different cultures must be in the tool kit of commanders, staffs, and personnel throughout the Joint Force. We might often be deployed for extended periods of time to provide stability and build capacity for self-sufficiency in a region.

Warrior Transition Care:

Secretary Gates reaffirmed our commitment to take care of the all-volunteer force, including life-long support for those who are permanently wounded. Currently 15,000 service members are wounded and unable to return to duty from our ongoing conflicts. We have had to dramatically change our culture and medical facilities to address these Wounded Warriors.

Joint Medicine:

BRAC and other forces are transforming Service medicine into joint medicine and likely a consolidated single military medical service in the future. This will require a major cultural shift and new innovative ways to lead, manage and support health services for all Services in an expanding range of missions abroad and in the home land.
Besides the traditional roles of Army Medicine these four future missions will be the focus of leadership for change in the coming years.

Factors and Forces Driving Forecasts of the Size and Structure of the AMEDD - LTC William Todd Echols

Introduction

The fundamental starting point for any military force developer defining force structure requirements is to understand the guidance and expectations in national strategic documents and

translate that into capabilities to meet the spectrum of potential missions. The AMEDD also has a larger mission of providing health support to a growing population of family members and retirees, which is in constant competition for resources. In a world of exponential change it is likely AMEDD will redefine itself several times before 2039.

Operational Drivers

In 2039 the "conventional" war machine will not look conventional at all. The Future battlefield will look drastically different with fewer war fighters in harm's way, and technology will dramatically reduce casualty and injury rates in unconventional environments. Soldiers equipped with smart sensor monitoring technology will enable combat controllers operating at a remote location to have immediate access to patient vitals and injury information, and be able to link directly into the closest Soldier or Medic to provide real time intervention. This is the actualization of a Net-Centric Warfare concept known as "Horizontal Fusion".

A steady upward trend from 19% of countries involved in conflict in 1946 to 25% in 2005 foretells a 2039 military operating environment of a complex network of state and non state actors creating challenges on multiple continents. The threat of a conventional war will be less likely, but the global economy will force the developed world come together in international cooperation to address numerous unconventional and humanitarian challenges to achieve global stability. Medical personnel will be called upon to respond to a wide range of crises created by non-state actors and as a result of over population in under developed areas with limited health capacity.

Healthcare Industry Drivers

In 2039 sickness prevention is an economic issue, not just a healthcare issue, as businesses, communities and governments come together to address behavioral and social challenges leading to expensive ill health in the population. Military Medicine leads the way in implementing prevention as the role model for the US healthcare system. The AMEDD's creation of the Public Health Command in 2009 was the first step to actualizing this new reality.

Technology Drivers

In 2039 robotics and telemedicine have transformed the healthcare industry and the proliferation of nanotechnology, virtual reality, and broadband wireless change the nature of the doctor-patient relationship. The presence of robots and virtual staff supporting clinicians can be found in health facilities and in home self-care. Technology has an ever increasing role in administrative functions such as reception and check-in. More of the jobs of allied health professionals are also performed by robots and virtual assistants. The ability to connect anywhere at any time has created a network of advanced medical treatment hubs that are connected to remote areas for 24X7 access to specialists. Most diagnostics are done remotely, and even virtual exams and surgery are often performed robotically (without cutting the skin).

Education can be achieved anywhere with virtual classrooms and skills are taught and maintained with realistic simulations. Smart agents provide just-in-time education and coach both providers and patients. In short, technologies have transformed all aspects of health and health care.

Implications to Future AMEDD Force Structure

In 2039 Military Medicine is a leader in the international landscape. AMEDD is flexible in adeptly supporting a range of operations from low level humanitarian operations to full out conventional war, and can quickly shift between missions as demands change. The advanced technologies of 2039 enable our medical force to deliver health care in remote locations with modest support requirements. AMEDD officers have the cultural and regional area expertise to easily integrate into any foreign situation. Prevention and public health are central to care of the force and in addressing emerging global health issues. Personnel also are expert in helping build health infrastructure and teaching local professionals how to effectively create their own health systems. As government and civilian health capacities merge into a single system for all Americans, beneficiaries will utilize that common national system leaving a smaller military medical department to focus more on its operational responsibilities. Automated robotics, biotechnology and knowledge systems will replace many jobs performed by providers and technicians, while at the same time new support staff will be necessary to service all the technology.

What size will the AMEDD be in the future? It is likely the AMEDD will shrink due to all the changes mentioned above, but it must remain flexible to acquire the right expertise and be able to surge when missions require it. What will the AMEDD structure be in the future? It is likely Service medicine will consolidate into a single military medical department, and much of peace time beneficiary care will shift to a national health system. However, the military will always require well trained professionals to meet the complex demands of varied operational missions. Military medicine must have the structural flexibility to operate in this complex and technologically driven environment and function as a learning organization. Its critical importance must not be forgotten and neglected.

Factors and Forces Driving Recruiting and Retention for Military Medicine in 2039 - LTC Tracy Werfele

New Style of Battle and a New Type of Recruit

In 2039 battles require a lot fewer soldiers and a lot more unmanned smart weapons so few "Agents" (service members of all types) are engaged in hand to hand combat. However, recruiting and training Agents is a serious long-term task because of the required capacities of future warfare. Individuals undergo rigorous evaluation for selection, beginning as early as conception for some special needs to as late as middle school for the rest. Selected individuals receive special educational preparation and training experience during their critical learning years.

Magnet Status Forces

During the earlier part of the 21 century many hospitals worked hard recruiting the best, creating centers of excellence to attain "Magnet Status" setting a facility apart from another in reference to its elite nature and delivery of superb quality healthcare. The same applies to sought after careers in the US Medical Alliance (DoD Medicine). Parents flock to recruiting stations trying to get their children accepted because of the superior education and long-term benefits for the entire extended family as a result of the a child's future military service. Service in the U.S Medical Alliance is a sure stepping stone to top corporation positions and political office. All Recruits must have a minimum of dual Bachelors degrees: one in strategic sciences and the other in a medical specialty.

Delineating the Best of the Best

In 2039 recruits that have completed the necessary requirement are assigned based on a multiple factors, including knowledge, skills, and the results of genetic and psychological tests so that the right people are working together for mission accomplishment.

A Workforce Responsive to Mission

There has always been a critical nursing shortage, and in 2039 even with most chronic diseases eliminated or under excellent control there is still a shortage because of an aging population (average life expectancy of 92) requiring a lot of assisted living. Family members no longer are prepared to provide this ongoing care so the U.S. Medical Alliance has 38 long-term care facilities nationwide. Seventy seven percent of recruited nurses go to LTC while those carefully chosen for acute and hospital care are involved in ongoing research determining evidence-based best practices.

Retention Incentives

Parents of recruits pay for all educational requirements until their child is on active duty. At that point the family receives a monthly stipend. Military personnel receive pay higher than the civilian sector for retention. At the end of 15 years active service members must retire to allow a fresh diverse group of new personnel. However, the member receives full pay for life and the family continues to get the stipend for life if the child serves the full 15 years.

Technology and How It Will Change Education/ Training and Make Many Professional Tasks Obsolete For Military Medicine in 2039 - MAJ Shawn Gelzaines

Introduction

There will be many technological influences that will change the AMEDD workforce, and the entire Army, by making the individual Soldier free from disease, quick to recover from injuries, and on

duty years longer than the Soldier of today. New technological advances in virtual reality and methods of learning will allow the AMEDD of 2039 to increase an individual's speed and capacity to learn. Additionally, advances in information management, communication, and virtual systems will increase the accessibility and realism of training. In the end these future technologies will change what the AMEDD needs to instruct, how they will instruct, and how Soldiers will learn.

Technology Changes that the AMEDD will need to provide education/training

Tremendous technological advances dramatically changed professional skills required and the way these skills are taught and maintained**:**

- Robo-surgery was developed in the military so its surgeons are the leaders in its use on the battlefield as well serving remote areas in peacetime. Sophisticated simulations were developed to provide training and ongoing skills maintenance.

- Use of stem cells and other regenerative therapies for rapid healing, tissue repair and organ replacement is another success of military R&D that is routinely used for treating lost limbs and destroyed organs to dramatically reduce battlefield deaths and disabilities. This is a military capability of excellence, again with advanced educational and skills maintenance methodologies.

- Advances in communications, knowledge technologies and automation devices by 2039 require specific instructions by both medical staff and service members for successful use in self-prevention and care, and to manage battlefield injuries.

- The use of genetic and proteomic data in Soldier preventative care will be used to create a career health plan and counsel Soldiers throughout their service. The result is an Army free of disease and super-healthy with the resilience to successfully manage operational stress.

- Nanomedicine is routinely used in "auto-care" where nanobots tied to sophisticated knowledge technology constantly monitor each Soldier's health and automatically intervene to address developing diseases and invasions of harmful pathogens. Nano devices also automatically deliver drugs to maintain homeostasis for patients with diabetes and other diseases.

Future Training Methods

All of the above new technologies will require training in the 2039 AMEDD. Technological advances permit new training methods such as video simulation and virtual 3-D classrooms. The field of neurotechnology develops ways to increase the speed and amount of materiel an individual is able to learn, creating "super-students."

Playable software simulators will be used to instruct medical personnel on handling different types of events. They will be able to practice and maintain skills with realistic simulations, often involving several personnel simultaneously working together from afar, on how to handle battlefield and civilian casualty events. Evaluators will be able to observe and give real-time feedback. Simulations will also be a required part of periodic skills recertification.

Technology Changes and Impacts in the Workforce

Technologies like the use of robots, biogerontology, embryonic stem cells, and artificial intelligence will have a significant impact on the workforce of AMEDD in 2039. They will allow personnel to more accurately predict, diagnose and treat diseases, even performing these tasks from a distance. New personnel with new skills will be needed to use and maintain these technologies. At the same time many functions will be automated, or effectively managed by personnel with lesser training. Additionally, these technologies will increase the health and service life of the individual Soldier, reducing the amount of new Soldiers the Army is required to bring into the organization and train each year.

Conclusion

The technology that will be available to the Army Medical Department in year 2039 will impact the personnel and the types of tasks that they perform. AMEDD personnel will be an average 10 years older by 2039. There will be more personnel focused on researching and developing the newer technologies such as robotic surgery, nanomedicine, stem cells, genetic data and proteomic data. Medical practices such as manual surgery will become obsolete. Personnel will no longer need to attend long training courses, and will be better trained through the virtual world. Due to the advances in robotic surgery, nanomedicine, and telemedicine the AMEDD will have less of a need to deploy different medical specialist and more of a need for general skills in medical professionals that are able to tap back into the institutional knowledge at the AMEDD centers around the world. And the AMEDD will require an all around highly educated workforce to support this highly technical organization.

The Army Medical Department in 2039 should be a high tech workforce and a world medical technology leader by 2039. Today it should create strategies to obtain the resources for researching and developing future technologies. Educational investments in AMEDD personnel should continue and increase in the future, ensuring that they become the experts in their field. Partnering with civilian corporations in development of technologies and using off-the-shelf products can assist in maximizing the limited resource dollars the AMEDD has to spend. But by year 2039, the AMEDD should be viewed as the Microsoft in medical technology and medical practice.

Non-Technological Factors and Forces Driving Training for Military Medicine In 2039 - LTC John Kent

While the future is certain to hold a host of technological advances requiring changes to how and what training the AMEDD will need to provide, there are also many non-technology related factors that will require changes in the approach to training and maintaining a high functioning AMEDD.

Globalization of Healthcare

Students entering medical training in the US increasingly come from foreign countries and an increasing number of international medical graduates (IMGs) come straight into the US health care workforce. Globalization also results in outsourcing of US health care services overseas such as Nighthawk Radiology Services and medical tourism where US residents get surgery and other extensive therapies in foreign medical centers. All this led to the realization that professional training and care delivery all over the world is becoming more uniform and of high quality. It will make sense to recruit internationally for medical professionals for the US, including our military.

Aging of the US Population

The population over 65 years of age is steadily growing, life expectancy is increasing, and people are quite capable of working long past 65. Medical technological advances control chronic diseases and assistive devices are permitting aging in place with a high quality of life. At the same time the military frequently has trouble recruiting enough personnel, and it takes a lot of effort to give recruits the necessary training and wisdom to be effective in fast-paced modern warfare. But, the military emphasis on physical conditioning and wellness keeps personnel fit enough to perform their duty long beyond a traditional 20-30 year career. By 2039 qualified personnel can remain on active duty until 70. Career pathways have been designed so that this does not unduly limit promotion and assignment opportunities of younger service members.
The Army needs to study ways to keep personnel longer and shift effort to retention and training instead of recruiting.

Physician and Healthcare Professional Disillusionment/Dissatisfaction

Years of disjointed health care reform generated a significant amount of turbulence in health care professions. Staffing shortages in nursing and primary care were exacerbated as the new providers struggled with pressure to lower overhead costs and increase productivity while dealing with technological and administrative complexity. The result was low morale and finally revolts. Military medicine with its leadership and cohesive culture worked hard to address these dissatisfiers and maintain a reputation of collaborative professionals creating world class health care. The result is good retention, satisfied patients and staff, and resilience to rapidly adapt to challenges. It also increased recruiting appeal for a military career.

Converging Cultural Demographics

Rapid population growth in the developing world, shrinking population in much of the developed world and a population shift to urban areas, especially mega-cities, has resulted in many public health and cultural challenges with resultant sickness, violence and conflict. Much of the world's population is also vulnerable to natural disasters and infectious disease outbreaks. These forces produce the instabilities underlying most of the humanitarian, peacekeeping and regional conflict missions of the 2030s and the resultant long-term stability operations to create functional societies. Military medicine is a central part of these missions and they usually work with coalitions and serve local populations in carrying out these missions. Medical personal are trained to be cultural experts for a part of the world, speak the language, and understand the regional disease threats. They know how to work effectively in international teams, create health infrastructure and teach others how to effectively provide care locally.

Recommendations

Refocus development of EHR to actively support decision making of providers and patients. The current EHR functions predominately as a medical documentation tool. Immediate and sustained activity must be engaged to refocus development to first support clinical decision making in support of improved outcomes in health. That effort must then evolve into a robust artificial intelligence that can be accessed by patients, providing them input and output to support continuous monitoring and improvement in personal health status.

Develop proactive recruiting efforts targeting international medical personnel (target for quality vice availability.) Healthcare is global. To remain capable the AMEDD must proactively engage quality overseas medical training programs and leverage the technical and cultural competence of their graduates.

Develop a flexible and responsive manpower system that can proactively respond to changes in demand and skill requirements including a professional recruiting activity for civilian clinical leadership in Military Medicine (ISO Primary/Preventive Care and R&D efforts). Dramatic changes in quality and quantity of health care professionals is extremely likely. AMEDD must develop far more flexible and integrated recruiting and retention programs. Programs must include military as well as civilian professionals and will need to balance the quality of professional life for both groups across the continuum of care and ranks, grades, and job series.

Develop robust international cultural competency training. Another requirement generated by globalization of healthcare which will reach into every medical facility as well as the increased utilization of AMEDD professionals in international operations where health care (including public health) are primary tools for engagement.

Prepare Military Medicine to simultaneously support combat and diplomatic efforts. As discussed above, AMEDD leaders will increasingly be called upon to serve in leadership roles on a variety of operational missions. Many if not most will require participation in international coalitions. AMEDD must develop a competency to operate in lead as well as support roles in such coalition efforts.

Enhance outcomes research on wellness and disease prevention. AMEDD success in leveraging the ever increasing lifespan of our Soldiers and Families will require significant improvement in delivery of early and consistent preventive care. Failing to generate effective outcomes will result in longer life with low quality of health resulting in an increased demand for health care and an inability to leverage the aging personnel productively.

Develop force structure to support increases in technology/automation and work "lifespan." Current force structure is determined on an attrition model that caps at roughly 30 years of service and works down from there. As AMEDD wellness improves working lifespan of Army personnel, AMEDD must develop a force structure model that leverages this incredible experience pool to reduce turbulence and optimize effectiveness of the service.

Develop and refine education strategies to leverage distance learning and technology. New technology will revolutionize delivery of healthcare education. Tools such as virtual reality trainers, robotic trainers, simulations and artificial intelligence will cause self directed and dispersed learning to explode. AMEDD must prepare now for this with early implementation and integration as each new technology presents itself.

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AMEDD Futures 2039 Virtual Work Group 6 Report:

The Power of Military Medicine for Geo-Political Aims

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The Power of Military Medicine for Geo – Political Aims: Summary

Group 6 examined the potential role that the AMEDD will play in the geopolitical environment in 2039. In order to examine the ultimate role AMEDD could play in geopolitics, six separate areas were examined to arrive at a forecast:

1. Status of Geopolitics in 2039
2. Position of United States within Geopolitical environment in 2039
3. What will military strategy look like in 2039?
4. What will military medicine look like in 2039?
5. What will medicine look like in 2039?
6. How could medicine influence geopolitical environment of 2039?

By examining these issues in series, a clearer forecast of the AMEDD's role in geopolitics could be derived

Status of Geopolitics in 2039

The traditional post World War II institutions will continue to lose influence as non-state actors continue to have growing role throughout world. These non-state actors will be important actors in global economy and will play major role in addressing the issues of the day which will focus on resource shortages, particularly potentially significant shortages in food and water in an increasingly urbanized world. These non-state actors will include large multi-national corporations, large charitable organizations and multitude of NGO's whose numbers have exploded over past three decades. Implications for AMEDD include the need to partner with an increasing number on non-state actors (NGO's, Corporations, Charitable groups) in dealing with growing medical issues associated with shortages of food and potable water and the medical implications of urbanization.

Position of United States within Geopolitical Environment in 2039

The United States will not be the dominant political entity in 2039. It will hold role of "first among equals" with ever growing list of equals to include the European Union, China, India, Russia, and Brazil. This "first among equals" status will still give United States significant political power within world environment, but will also require the United States to work much more cooperatively with other nations and non-state actors to achieve political goals. The United States will no longer be in a position to act unilaterally to achieve political aims. The United States strategic goals will focus on continued economic growth in areas of world that are outside growing circle of economic prosperity that globalization has created. The United States will have developed very close diplomatic and economic ties with all rising nation-state actors, but will also have developed these ties with non-state actors. Cabinet level position will have been created to help coordinate U.S. Government activity with multi-national corporations and NGO's. The Secretary of this department will be included on National Security Council and will be considered co-equal with Secretaries of Defense and State. Implication for AMEDD will be it will have expanded role within U.S. government for interaction with NGO's, many of which are health-care focused. AMEDD "speaks the language" of

these NGO's and U.S. government will have heavy reliance on AMEDD to interact, communicate, and coordinate actions with these organizations.

What will Military Strategy look like in 2039?

Military strategy in 2039 will be focused on regionally oriented issues targeting the "hot spots" of economic integration of the non-globalized world into globalized whole. While the military will retain some "classic" war-fighting abilities, its primary abilities and strategy will focus on these regions requiring much greater cultural expertise and emphasis on building relationships with local and international partners. The military will have engaged in extensive training over past two decades to achieve cultural competence both within these regions, but also with other agencies engaged within these regions. Technologic advancement will no longer focus on improving major combat platforms, but will focus on ability to communicate seamlessly with all cooperating parties within areas of interest. U.S. military will still be relied on to be major security provider in these "hot spots", but security building will be provided more through relationship building and support of other U.S. government and international organizations rather than at the "point of a gun." Implication for AMEDD will be that while it will still retain classic health care delivery role for deployed U.S forces, it will also have ability to act in regionally, culturally-sensitive manner to allow for even greater interaction with local communities and even broader application of military power.

What will Military Medicine look like in 2039?

In the year 2039, AMEDD will find itself in the role of health care consultant to others in the health care industry as we share the successes experienced over the past two decades. By 2019 the database established by AMEDD to assess treatment modalities against healing has given us a true evidence-based practice. This has yielded total transparency on costs and results of care. Partnerships with NGO's and various non-profit organizations have funded the expansion of our learning environment to outlying populations as we collect data on successful treatment of diseases endemic to those regions. Biosensors give accurate feedback to log the effects of all components of health including sleep, diet, herbal supplements, exercise, hygiene, and individualized treatment interventions. By having a truly evidence-based practice, costs decrease, inpatient stays are fewer and of shorter duration, antibiotics are used accurately so as to not yield resistant strains, pain is minimized, and health and quality of life are maximized.

By 2039, the AMEDD is the proven leader in seeking to provide the highest quality of care to beneficiaries. By establishing an understanding of where the best knowledge exists, best treatment options exist, best access to care exists, the AMEDD has established "give and take" partnerships. Rather than "reinventing the wheel," AMEDD officers are afforded opportunities to train in hospitals, labs and clinics of allied nations where these successful practices already exist. These successes are then implemented into the way the AMEDD practices. By training health care providers of allied nations in our own GME/GDE programs, hospitals, labs and clinics, the AMEDD benefits in countless ways. Retention of soldiers is increased in turn as service members seek to qualify for this high-quality, life-long care. An increase in retention of AMEDD officers is also obvious as they are attracted to the opportunities for travel, and education.

Cultures once opposed to the U.S. are seeking her favor in the year 2039 as the AMEDD has proven able to aid and heal. As the AMEDD has shown a willingness to train health care providers of allied nations, the populations of those nations also experience an increase in health and overall quality of life. As a loved one is healed, human emotions of gratitude are evoked toward the healer. As the AMEDD provides that role of healer to other populations, those populations in turn have a sense of indebtedness toward the AMEDD and the U.S. which proves to be a critical component of the AMEDD's role in geo-political aims.

The implication for the AMEDD is the continued need to be leader in evidence based practice leveraging electronic/digital capabilities to accurately determine true evidence based practice. It will then be essential to export this knowledge to not only civilian sector with United States, but also outside to allied countries and multiple non-state actors. AMEDD can leverage its extensive experience in training to become trainer of best practices throughout developed and non-developed world.

What will Medicine look like in 2039?

The future of Medicine will focus on utilizing advanced technologies to identify, prevent, treat and manage diseases. Nanotechnology will become the treatment modality of choice for such diseases as cancer, diabetes, bacterial infections and as a tool to lengthen the human lifespan. Virtual medicine will become a preferred choice for delivery of care, bringing the physician to the patient within a work, mobile or home environment. Implantable microchip devices will be developed that can transmit an individual's biological information to remote experts for immediate interpretation and treatment recommendations.

The consumer will be held accountable for taking charge of their own health. On every street corner, a mass media blitz of wellness and preventive health activities can be found from subways to suburbia. A wellness card, embedded with an individual's mental, spiritual and physical data characteristics can be inserted into a home bound or portable robotic device. Based on the client's individual data, this device can interpret the most appropriate behavioral modification technique and advise the client on how to maintain appropriate wellness choices throughout the day. Pharmaceuticals will be developed that can cure obesity, heart disease and reverse the aging process. As the world become healthier, the average life expectancy rate climbs to 90 years.

How could medicine influence geopolitical environment of 2039?

In 2039 Military medicine is part of the U.S. National Strategy promoting economic growth in emerging small economies. As the US National Strategy continues to influence the geo political map of the World and the economies of those emerging democracies are in need of viable markets, Military medicine will continue to provide a positive investment in these emerging economies. The Army Medical Department's contact and cross training programs are constructive investments that through Military to Military contact will assist the country in building a Military Medical Force that will have direct impact on partnerships with an emerging health care industry; educational institutions and human capital. One practical method to engage these small armies is when many countries cannot afford a large full time medical department is through the Army Reserve Medical

Department which can engage in building Reserve Structure in these poor countries. It is through partnerships with industry and their Reserves components that these highly skilled citizen Soldier will be embedded in the communities. This investment in human capital will establish a base in which a health care industry can grow. Poor economies that were dependent on providing health care to their citizen are now given skills through military medicine to build a health care industry.

Implication for AMEDD is that it will need growing awareness of the business aspects of medical practice and its interaction with entirety of local economy. This developing awareness will need to be in conjunction with its already well-established abilities in medical education and training and evidence based patient care.

AMEDD Futures 2039 AMEDD Role in Geopolitics Forecast

AMEDD takes the lead in harnessing biotechnology and culture change to improve health for soldiers and citizens. This ability provides the U.S. with a strategic asset in winning allies who work to make globalization a benefit for more of the world's population, especially in the developing world. The ability to improve health in regions, countries, communities, families and individuals creates a basis for economic and political development and peaceful coexistence. While enemies still create security threats that war fighters face, military medicine works to reduce the number of areas in the world that support those enemies.

Due to its increasing role in training and medical education throughout globe, and its long-term interaction with rapidly growing number of NGO's, AMEDD becomes subject matter expert for global medical needs assessments and knowledge warehouse for global medical capabilities. The net result is that AMEDD is coordinator for a medical development within non-developed world. It will assess needs for given area and then coordinate application of properly trained and resourced NGO's into area. AMEDD will achieve this coordination through extensive interactions with U.S. government agencies specifically targeted to develop these culturally-based relationships within reason. AMEDD will still provide direct patient care to beneficiaries and to selected patients within deployed populations, but their primary role will be integration of medical training and resourcing within specified high risk regions throughout globe. AMEDD will be valuable arm of U.S. geopolitical strategy creating environment for both medical and economic growth within regional hot-spots throughout globe.

Potential Alternate Forecast

If the AMEDD does not realize its potential in the areas of evidence-based practice, global medical training, and integration and cooperation with medical non-state actors, serious threats to U.S. geopolitical aims may arise.

Without the benefit of advances in evidence-based practice, the AMEDD will not be recognized organization for excellence in patient care. Without this recognized excellence, future training opportunities for health care providers throughout world will not be available within AMEDD system, and opportunities for AMEDD providers will not be available throughout world. This lack of person-to-person interaction will greatly threaten ability of AMEDD to be "honest broker" in

interactions with non-state actors, particularly NGO's. The result will be a dyscoordinated application of health care assets within the developing world and regional hot spots that will become focus of regional and global conflict. AMEDD's realization of its 2039 role as global source of knowledge for evidence based practice, world-wide medical training, and interagency coordination will make an indispensable arm of U.S. geopolitical strategy in 2039.

Recommendations for AMEDD

1. Continue to push focus on evidence-based health care delivery. AHLTA must live up to promise of delivering key epidemiologic data to trigger evidence-based approaches. Specialty-based, research consortiums must be established and funded by AMEDD to run requisite clinic trials and epidemiologic studies to keep AMEDD in forefront of this endeavor. AMEDD must harness the research power of its large enrolled population to deliver the benefits of true evidence-based care and become recognized world-wide leader in this area.

2. Invite key medical NGO's to multiple planning conferences sponsored by AMEDD to determine needs and capabilities of key players in world-wide health care delivery and begin conversation as to how best communicate with these players. Invite key NGO personnel into planning circles within AMEDD to develop person to person contact that will be key in further integrating AMEDD actions with actions of NGO community in delivering health care around the world.

3. Begin training of all AMEDD officers in importance of stability and security operations and in role military medical forces play in such operations. If AMEDD is going to play leading role in these endeavors in 2039, training of all AMEDD officers must begin now. Include junior officers in planning conferences with NGO's to again establish person-to-person contact across spectrum of personnel that will be key in establishing AMEDD's role as trusted organizer of medical resources.

4. Create a position for Consultant for Security and Stability Operations to Surgeon General. At this time, the Surgeon General has group of consultants that are primarily centered around the medical specialties they represent. Creation of a consultant position for Security and Stability Operations will allow Surgeon General to have key subject matter expert to help implement multiple numbers of these recommendations.

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Appendix 1: Jointness and Beyond (VWG 1) Individual Papers

Jointness and Beyond - COL Timothy K. Jones

The most significant changes in Military Health System's and our nation's governance will be driven by external forces. These external forces will have a direct impact on the continuum of health services as we know it today. In addition to healthcare, there are other multiple competing demands for our national budget including defense, homeland security, national infrastructure, social security, and nuclear re-coring. How our nation responds to these competing demands may be the biggest influence on the future posture of the Military Health System.

The availability and affordability of health care will continue to be a significant national concern. In 2007 the total US spending for health care was $2.4 trillion-a rise of 6.9 percent -twice the rate of inflation and 17% of the Gross Domestic Product. It could reach 20 % of the GDP in the next decade. An increased world urbanization (2.6 billion in 2005 to over 4.5 billion in 2025) and world population (expected to be 8 billion in the 2030s with 95% of the growth in emerging nations) will add to the spiraling costs of health care. Also of great concern is *a*n even greater reliance on global economic interdependency and the blurring of international borders with global trade and large global corporations. The current daily transfer of capital among international markets is $1.3 trillion.

Changing security environments will profoundly alter the nature of warfighting with a preponderance of resources used to shape peaceful alliances and prevent breeding grounds of conflict and terrorist groups that arise from chaos, overcrowding, disease and high morbidity, and emerging population's overwhelming and hopeless poverty. Geographic Combatant Commander's will be asked to help with the intervention and stabilization of these areas. In our own country we have microcosms of poverty and decreased access to education and healthcare. In 2007 there were 2.8 million births to illegal immigrants and last year that number rose to 4.0 million. These populations could contribute to destabilization if poverty, education, and healthcare needs are not met.

Dramatic changes in information technology using virtual Knowledge Management as the driving enabler of health will continue to be a strong external driver. Knowledge Management will help promote awareness and the use of decision support, clinical workflow and other advanced knowledge management technologies for patient care and clinical research. It will help build a community of users, researchers and suppliers, and to disseminate development tools and techniques for building health care applications that comply with the highest possible quality, safety and ethical standards.

Disasters and emerging diseases will continue to drive emerging concepts for healthcare. Population migrations, urbanization, and the use of multi-national military task forces are a few of the trends that present changing health risks to our military. At least 20 well known diseases such as tuberculosis, malaria, and cholera have re-emerged in certain world regions and are more resistant to treatment. Since 1970 over 30 new diseases are now significant medical threats such as HIV, SARS,

Ebola, and hepatitis C. Also diseases can be introduced as biological agents. Experts have identified dozens of biological diseases that could be used as weapons.

The overuse of natural resources leading to shortages in particular oil and water will also be external challenges. The nature of these problems will be hard to predict and resultant change from them has the potential to take many paths.

How will we react?

A unified governance of military and our nation's health systems will emerge because our nation will recognize the importance of global health in world stability especially in emerging nations. We will acknowledge the requirement for a unity of command and unity of effort to accomplish our goals. The increasing cost of health will be unaffordable for our nation and our world at its current escalation rate. We can achieve significant cost savings through consolidation of efforts and the use of a unified command and control that places service chiefs on an equal footing to fully support the Geographic Combatant Commanders.

A glimpse at the year 2020 will show how we are progressing towards joint governance. By 2020 we have made the transition to a military healthcare system that is focused on the needs of the Geographic Combatant Commanders. Each Geographic Combatant Commander has a joint integrated medical structure. In addition to providing healthcare to our military beneficiaries, it has become apparent that one of our biggest exports is "health" to the Geographic Combatant Commander's areas of involvement. The importance of exporting health is now recognized as an important function of our National Security Strategy and our National Military Strategy. These joint medical commands support the Geographic Combatant Commanders by continually monitoring medical threats unique to each world region. Detection and monitoring of these threats are coordinated with our Centers of Excellence such as the Armed Forces Epidemiological Board, Armed Forces Pest Management Board, the Center for Disease Control, and other governmental and non-governmental organizations (NGOs). These Geographic Combatant Commander's medical commands will be knowledgeable of population migrations and urbanization which impact regional health. They will be knowledgeable of host nation and coalition health capabilities as well as NGOs and others available in the area. Working with these agencies to affect the health of the area will show the fruit of their works by positively impacting regional stability through health initiatives.

Having achieved these intermediate goals of service medical jointness that effectively supported our nation's security goals through the Geographic Combatant Commanders by 2020 we must now look to the possibilities of 2039. The reality that the cost of healthcare has become a destabilizing influence in our nation will prompt a change in the way we look at healthcare. Yes, new treatment protocols and practices learned through Knowledge Management will allow our population to live longer and increase quality of life but the cost is staggering. The economic realities of the cost of health will prompt national governance that includes the military health system, the VA, Health and Human Services, and civilian health organizations. This is necessary for the nation in order to take advantage of economies of scale, best practices, and emerging health treatment protocols to realize cost savings. National health insurance and even life insurance will have strong ties to this governance and will cooperate to harvest even more savings. We learned way back in 2009 that

organizations such as "Silver Sneakers" in which health insurance organizations pay for gym memberships and fitness classes of the elderly give back huge dividends in health savings. Utilizing this model, health and life insurance organizations will more closely cooperate with the national health governance in joint efforts to reduce health and insurance costs to our nation.

What else is achievable in 2039?

We will look at some possibilities in the realms of:

- Global Force Health Protection and Fitness
- Global Casualty Care Management and
- Global Prevention

Global Force Health Protection and Fitness: The most important and costly weapons systems of the military are service members-the ultimate guarantor of our mission success. Full spectrum operations will place them in extremely stressful environments with exposure to endemic diseases, occupational and environmental threats, and CBRN agents. The importance of health protection and fitness, including spiritual fitness, starting with pre-deployment interventions including improved vaccines, protectants, and healthy lifestyles contribute to mission success.

These lessons learned in the military are promulgated throughout our nation's population through the nation's health governance thus increasing health and fitness of our nation minimizing health costs. These lessons are "exported" to emerging nations to improve health and stability via the Geographic Combatant Commander's joint health commands. Geographic Combatant Commander's health commands deploy sensors, Knowledge Management databases, and interventions in at risk populations throughout their areas of responsibility contributing to global health and stability.

Global Casualty Care Management: The unprecedented casualty survivor statistics in OIF/OEF are just the beginning of improvements in casualty care and evacuation and continue to improve through 2039. Real-time sensors identify service members who are at risk to stressors and allow medical personnel to intervene even before they become casualties. Sensors are also used to identify, locate, and triage, and stabilize service members at the point of wounding allowing even more timely critical care and evacuation. For the nation these interventions are extended to the civilian population with sensors on individuals, vehicles and transit systems, and contribute to more healthy communities and increased survivability when trauma occurs.

Global Casualty Prevention: Disease and Non Battle Injuries continue to be the biggest drain on the fighting force in operationally and environmentally stressful locations. Mental health, environmental, and physiologic stressors can be identified and avoided when possible. When avoidance is impossible they can be minimized through stress protection. These Disease and Non Battle Injuries lessons are quickly distributed to the nation at large through the close relationship of military medicine with the national health governance. The exportation of these same lessons to emerging nations and populations is perhaps the biggest contributor to global stability and greatly enhance the mission of the Geographic Combatant Commanders.

In closing, in 2009 we are at a crossroads where we must develop our best and brightest leaders in military medicine to recognize and implement the full potential of health to benefit the military, our nation, and our nation's commitment to global stability.

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Primary Stakeholders of a Consolidated Healthcare System "Beyond Jointness" – COL Robert G Hale

A consolidated healthcare system "beyond jointness", a system that involves the Joint Military Healthcare System (JMHS) and at least the Veterans Administration, could extend to all levels of government in the form of National Healthcare Insurance. Any consolidated system requires careful consideration and analysis by the potential primary stakeholders of the system. To identify the potential stakeholders, the stakeholders of a JMHS are analyzed before extrapolating the analysis "beyond jointness". Identifying the primary stakeholders of any healthcare system is extremely important before considering a plan to consolidate because, firstly, their involvement in the project significantly increases chances of success by building in a self-correcting feedback loop and, secondly, involving them in project builds confidence in product to ease its acceptance to all stakeholders. Stakeholders will be identified as internal and external stakeholders and by executive, end-user and supplier stakeholders in order to elucidate all entities of a consolidated healthcare system.

The JMHS is a consolidated system of the Army, Navy and Air Force-Active and Reserves-with the mission to provide responsive, capable, coordinated medical services to conserve the fighting strength of worldwide deployed service members (battlefield to rehabilitation), provide comprehensive healthcare to beneficiaries and provide training to the medical force. As an entity of the federal government, the JMHS has operational plans to respond to mass civilian casualties from natural disasters, terrorist attacks and WMD on a continental and global scale. Primary stakeholders of this system can be considered internal or external.

Internal stakeholders of a JMHS include Secretary of Defense, Service Secretaries, Service Chiefs, Combat Commanders, Congress, appointed medical executives and medical flag officers. Arguably, every decision maker who makes a living serving the JMHS is an internal stakeholder, to include officer-providers. External stakeholders of a JMHS are the customers of the consolidated system. This would include the defined beneficiaries or end-users: service members, dependents, and retirees, all stakeholders of a healthcare system designed to provide total customer solution to their healthcare needs. Commanders are also external stakeholders of the JMHS because they require a responsive, capable, coordinated medical force to project worldwide at anytime, to any contingency. Suppliers, vendors, and contractors are also external stakeholders or experts (providers of service) of a consolidated JMHS.

"Beyond Jointness" assumes a public need to expand beyond the armed services. The most natural consolidation "beyond jointness" is adding Veterans Administration responsibilities but this extend to all healthcare entities administered by the federal government, the Public Health Service, Federal Prison Healthcare System, and the Indian Health Services. Stakeholders of this Federal Healthcare System could be identified readily as elected/appointed officials and medical executives of each respective system, and the executive overseeing the consolidated system. External stakeholders would be defined beneficiaries, commanders, wardens, village leaders and the public, at large.

"Beyond Jointness", beyond a Federal Healthcare System, could include beneficiaries of the federal government with services provided in public and private healthcare systems. This consolidation

would add the Centers for Medicare and Medicaid Services (CMS) to the system which, in essence, would add every participating hospital and provider, nationwide, under a Consolidated Federal Healthcare System, a system that would function as a National Healthcare System. Now internal stakeholders include medical executives of CMS, CMS affiliated health plans, hospital administrators, medical staff executives, university hospital executives, and every contracted medical group servicing the beneficiaries of this expanded system. External stakeholders will include large groups of citizens from the very young neonate, to the sick/disabled, to the elderly, and just about everyone in between. The only other system would be worker's compensation system and private healthcare, fee-for-service.

"Beyond Jointness": A Situational Scenario

A combination of scenarios, a surge in urbanization, water/food/energy shortages, pandemics, global economic collapse, civil disturbances, terrorism and domestic/international crises, may strain the public and private healthcare delivery systems to a critical point of failure. If the "reset button" is pushed to stabilize a failed US healthcare system, should the JMHS take the lead and embrace "beyond jointness"?

Pro: Military leadership is in position to quickly mobilize basic healthcare services to refugees/DPs in coordination with FEMA/NGOs on short term basis. Expansion of JMHS to oversee and sustain a national healthcare mission is possible with comprehensive consolidation of other government health services. Military beneficiary healthcare is a vehicle to train the medical force…expansion of military GME to society-at-large benefits trainees and society. Undoubtedly, resources can be coordinated and consolidated at a savings.

Con: JMHS expertise is deployment healthcare from battlefield to rehabilitation. Readiness and competency to prevent, evacuate, and treat tropical diseases and battle injuries are unique to military medicine (CBRNE and tropical/indigenous diseases). Applying exceptional measures to rehabilitate injured Soldiers (high tech PT/OT, prostheses, eye refraction surgery, and limb/face transplants-all efforts to RTD injured personnel) are not applicable to civilian population. JMHS projects healthcare overseas as an instrument of national power (OOTW, SOSO, DIME). Mission creep is a hazard to primary mission.

Are benefits of the consolidated system the same for all beneficiaries, citizens, service members, and prisoners? Do we increase benefits to level of military or decrease military to level of Medicare with possible denial of treatment? Are Commanders willing to give up control of JMHS? Are citizens willing to pay for current system of Medicare for all citizens, or accept a "defined" benefit based on a fraction of GNP?

Military Medicine 2039 Jointness and Beyond – Richard Beauchemin

What Is the Status and Process on TDA AMEDD Reorganization?

In 1973, reorganization of the Army Medical Department established the U.S. Army Health Services Command (USAHSC) as a major Army Command under the jurisdiction of Department of the Army. All class II facilities and activities in CONUS were assigned to USAHSC along with and the U.S. Army Garrison, Fort Detrick. The reorganization relieved OTSG of most command and operational responsibilities allowing it to focus on the staff responsibilities of TSG.

As the Army shrank during the post-Cold War period, USAHSC initiated a new construct where it would operate in a more business oriented posture and act like a corporation. In 1992, USAHSC introduced Gateway To Care, a much more businesslike approach to the delivery of healthcare. It was localized managed care designed on catchment-area's run by regions. The intent was improved quality, access and reducing costs. By the fall, all USAHSC facilities had or were transitioning to the new business approach. Starting in 1994, Gateway To Care was gradually absorbed into the new DoD triservice managed-care plan – TRICARE. In 1993, the CSA approved TSG plan to reorganize the AMEDD by establishing an expanded medical command, U.S. Army Medical Command (USAMEDCOM) under the command of The Surgeon General. The plan called for the establishment of a U.S. Army Dental Command and U.S. Army Veterinary Command subordinate to USAMEDCOM along with seven Health Service Support Areas (HSSA). These new HSSAs had more responsibility and authority than the older USAHSC regions. The command was established provisionally as were the DENCOM and VETCOM. In early 1994, the Medical Research and Development Command, Medical Material Agency and the Health Facilities Planning Agency merged to form the Medical Research and Material Command. Later that summer, the Army Environmental Hygiene Agency formed the basis to establish the Center for Health Promotion and Preventive Medicine. Also, an additional HSSA was established in Europe to replace 7th Medical Command which inactivated. The USAMEDCOM became fully operational in October 1994 and in 1996, the HSSAs were renamed Regional Medical Commands. In 1998 the One-Staff concept was approved by the CSA which essentially integrated the OTSG and USAMEDCOM HQ staff's to further refine the Command and Staff mission and relationships.

In December 2007 and January 2008, the CG, USAMEDCOM established a group to review how the MEDCOM was organized. The CG's purpose of the reorg was summed up in his statement, "The elements of an organization that determine its longevity is its ability to project its value into the future". Additional guidance was to ensure that the MEDCOM reorg is supportive of the CSA's Army Enterprise Initiative. The group developed five Lines of Effort which the CG approved: (1) Realign Regional Medical Commands (RMC); (2) OneStaff reorg; (3) Develop a Public Health Command; (4) DENCOM realignment; (5) WTU/AMAP reorg. The outcome of this effort will be: (a) re-aligned the CONUS RMC boundaries along TRICARE Regional Offices (TRO) boundaries resulting in reduction a of CONUS RMC's from 4 to 3; (b) reorganize DENCOM CONUS Regions along TRICARE boundaries going from 4 to 3; (c) Transform MEDCOM Health Promotion and Preventive Medicine assets to a Public Health Command (d) Continue with the stand up of a Warrior Transition Command and associated elements.

Future:

While the MEDCOM reorg and the Army Enterprise Initiative will provide the structure to enable the Army to be more efficient, effective and correctly focused, the probability exits that further change will be necessary to meet the demands of a changing environment. The Army is in a period of enduring conflict and will require significant medical capabilities in order to meet the demand to support the force. While the budget is always a primary influence on anything we do, decisions by the Senior Leader's of the Army or OSD could have a dramatic effect on the medical organization. It is doubtful that the Army will make dramatic shifts to the GF MEDCOM organization so beside evolutionary changes, the reorganized MEDCOM would be expected to resemble that configuration. OSD decisions could have greater ramifications. They run the gamut from status quo, single service, more jointly staffed facilities, JTFs, sub-unified command, unified command, defense health agency. The last three (sub-unified command, unified command, defense health agency) would mark a revolutionary change to the way we have been organized to provide healthcare to the DoD. There are now and will continue to be proponents that specifically support one of these organizational designs but none has ever gained sufficient traction or political support to move beyond the "study or report" phase. Some view the stand-up of JTF CapMed as a precursor to a Unified Medical Command but the environment that led to standing up the JTF were not motivated by the thought of an eventual UMC. Costs, the hope for efficiencies, focus, visibility (NCR) and the WRAMC issue were the primary drivers that led to a JTF. While this could ultimately lead to an overarching organization charged with DoD healthcare (sub-unified command, unified command, defense health agency), I see no large scale movement within the DoD or Congress to make any of these a reality. What I could envision is that either due to escalating costs or OSD/COCOM/JS/Service Senior Leaders growing frustration with having to continually deal with medical issues and with multiple organizations, a scenario could play out that results in all medical coming under a single organizational structure. That single structure could easily be a DHA using DLA as a model. Politically, this design might have the greatest support and would be fairly easy to transition to a FHA that would include the medical piece of the VA. The most difficult piece to execute is the deployment piece for the respective Services. Additionally, the non-DHP and structure would require significant work to ensure that all equities are adequately addressed. It this structure were to gain traction, the MEDCOM reorg as envisioned, appears to be appropriately designed for smooth transition into a DHA. However, if there are structural pieces to a proposed DHA that the Army/MEDCOM would want to either be postured to lead or heavily influence, they should be specifically be put in place now so when/if a DHA becomes a reality, the MEDCOM is prepared.

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Major Events Influencing Reorganization/Potential Model for Future Military Medicine – Joseph Vancosky

The healthcare industry in the United States is undergoing a tremendous transformation, and Military Medicine is no exception. Military medical leaders have a unique opportunity to be at the forefront of this transformation as they are entrusted with the largest organized universal health care system in the country. Changes are nothing new to the military and certainly not to military medicine. What is different is the speed in which these changes are occurring (and will continue to occur) and the changing environment in which we operate. In this brief report I will examine some of the major events that will influence how the Army Medical Department will need to organize itself for the future and propose several key components for a potential model on what our future military medical force will look like in the year 2039.

Major Events Influencing Reorganization

Technology

Advances in technology will be one of the most significant "events" that will influence the organization of military medicine over the next two decades. We must not think of technology as a single event, but rather a series of advances and breakthroughs that combined will drive our entire organizational structure from delivery of health care to command and control in 2039. From the current deployment of the electronic medical record to the future use of nanotechnologies, revolutionary technological change on an exponentially growing scale is already here. This change mandates that military leaders institute a continuous transformation process that includes all areas of doctrine, training, leadership, and organization. The continuing wave of medical technological change is different from the information technology revolution of the 1990s in two ways. First, it is a vastly more profound transformation due to the synergy of four emerging technologies: bio-engineering, nano-engineering, robotics, and artificial intelligence. Second, it is a revolution that will occur at a speed never seen before. Military leaders and military medical planners will need to evaluate the effects of these technological influences to correctly predict the impact on Military Medicine.

Policy and Paradigm Shift

"The military health care community has transformed battlefield medicine by working together and the services must now bring that same spirit of jointness to the management levels" said David S. Chu, Undersecretary of Defense for Personnel and Readiness at a recent conference of military health systems leaders. Dr. Chu's comments state the obvious to many of us who have been working in a "joint" environment on the battlefield in Iraq or Afghanistan, or on the home front in the Military District of Washington or in San Antonio Texas where we are merging monolithic infrastructures and organizations that were built over many of the past decades. Amazingly enough, this transformation has occurred and will continue to occur despite the efforts of many military

leaders who resist this necessary change. But in order to comprehend the type and scope of the change that will need to occur in the next two decades, we will need to take this "spirit of jointness" to a level much higher than many of us have experienced in our careers. We must think of jointness not in terms of working with sister services or with our counterparts within the Department of Veterans Affairs, but rather in terms of working with the Department of State and the Department of Health and Human Services as an operational component to policy makers. Whether we agree with it or not, our military (and military medicine) is being used globally as a politically stabilizing force. This trend will continue in future decades. In order for our military leaders and medical leadership to position themselves properly, they need to accept this paradigm shift and develop a coherent and clear vision of joint operations beyond its current view. Additionally, joint units should be formed to experiment with functional joint operational concepts in order to develop cohesion and to devise and revise the development of doctrine. These units and its command and control infrastructure should be standing in peacetime – not just thrown together ad hoc during times of crisis. Jointness is something that is upon us right now. But in order for us to be prepared and positioned for 2039, jointness should not be viewed as a concept, but rather an event that requires current and future leaders within military medicine to accept a paradigm shift unlike any they have experienced in the past.

Politics and Avoiding Conflict

Once again we find ourselves trying to comprehend how current events will shape our Nation's military in the future. As we examine the current political landscape it may provide some insight on what lies ahead for our military and military medicine. With political leaders elected every few years and the political landscape changing on almost a daily basis, I do not believe one single political event will influence military medicine in the next two decades. The reorganization of Military Medicine will be driven by our Nation's desire to avoid armed conflict. As the worlds 911 emergency service, people and governments around the world look to the military health system in a catastrophe. Humanitarian assistance plays a critical role in winning hearts and minds. Military Medicine and our Nation is successful when the people we assist say the U.S. military cares, protects, builds, teaches, and trusts enough to help. By building a "medical bridge to peace," the people in countries that could otherwise become hostile will be more likely to become our friends. Our success will mean less violence against Americans, fewer terrorist attacks, avoidance of armed conflict, and will be reflected in a more positive public opinion of the United States in the countries where we provide health services. Our political leaders already understand the importance of "exporting health" as a political tool. But the tendency has been to ignore or procrastinate until intervention has become the least attractive course of action. Our military leaders need to better understand the significant impact Military Medicine can have in influencing political outcomes. Military medical leadership must accept an organization that works hand-in-hand with policy makers to influence world events.

Potential Model for Future Military Medicine

Department of Defense Medical System

There are countless models that have been proposed for what the future of Military Medicine will look like in the upcoming decades. Each model has advantages and disadvantages. But any suitable model must perform a core group of missions and tasks:

1. Medical Readiness Mission – Ensure medical readiness of the armed forces is maintained in both peace and war time.
2. Health Benefits Mission – Ensure that quality health care services will be provided to eligible beneficiaries either in the direct care system or with civilian managed care support contractors.
3. Sustainment – Sustain the military health system in terms of recruiting, training, and retaining quality personnel. Obtaining and maintaining modern facilities and equipment.
4. Command and Control – Establish a single individual who will be responsible to the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the services for the accomplishment of medical missions and who will have the authority to integrate, direct, control, and allocate resources among the various medical departments, services, and units.

In a unified military medical service command and control would need to be clear cut. By unifying previously separated medical departments, opportunities to consolidate common functions would be endless. Consolidation would theoretically provide more effective use of personnel, more effective and efficient operations, and potentially a cost savings.

Conclusions

Military Medicine is in the unique position to have the sightedness, talent and leadership to lead the way in identifying those events that can influence the future. By understanding the impact of technology, policy, and political events, military medical leaders are poised to reorganize themselves and respond to future challenges they face. But to achieve a true transformation to the future, we as leaders will need to transform our culture in profound ways. Military leaders should boldly reach out in creating a world class health system. In the results of their efforts rests the health and well being of the men and women defending America, her friends, and her interests around the world.

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What existing Studies have been completed on Mil-Med Reorganization? – COL Thomas R. Tempel Jr.

Military-Medical Reorganization is a topic of frequent debate fueled by multiple collaborative projects and government reports. Most efforts focus on the anticipated shift to a more unified command structure; however, several also project changes 20 year out. This paper reviews major studies that looked into the governance of military healthcare and how it would evolve to leverage unique service capabilities and align leadership and resources to create synergy. Military and other government agency studies were reviewed, and the most significant will be listed from the earliest to the most current.

While many articles have been written on the subject, the following projects will be summarized: U.S. Army Medical Reorganization Volume 1. TF Aesculapius Jan 93- Jun 95, Congressional Budget Office report titled Restructuring Military Medical Care, July 95, MHSS 2020- Envisioning Tomorrow to focus Today's Resources, MHS 2025- Toward a New Enterprise, RAND 2001, Quadrennial Defense Review titled Roadmap for Medical Transformation, GAO Report to Congressional Committees titled Defense Health Care, Task Force on the Future of Military Health Care Report, The Joint Operating Environment- 2008, and the Military Health System Strategic Plan.

TF Aesculapius

Chartered by The Army Surgeon General in 1993, Task Force Aesculapius was a two and a half year project conducted during the most significant Army Medical (AMEDD) reorganization since the 1940s. The focus was on Army Medical structure resulting in OTSG/MEDCOM restructuring, HSSA development, Major Subordinate Command (MRMC, AMEDD C&S) review and several new commands evolving- DENCOM, VETCOM and CHPPM. External world factors such as the demise of the Soviet Union along with national demand for a smaller more efficient government shaped the need for reorganization. There was also a renewed interest in the Defense Health Agency with the change of administrations.

TF Aesculapius conducted in depth reviews of several reorganizations or proposals to include the Wadhams Committee Investigation in 1963, the 1969 Worldwide Organizational Structure for Army Medical Support (WORSAMS) study, the Class I and II organizations before Health Services Command (HASC), the 1973 HSC Reorganization, the 1977 OTSG reorganization and the 1987 AMEDD Command and Control Study. The result was a new MEDCOM that supported the "AMEDD vision, linking AMEDD assets worldwide into a high quality, cost effective, and accessible healthcare organization servicing the total army family across the globe."

Restructuring Military Medical Care- C.B.O.

The House Committee on National Security requested the Congressional Budget Office (CBO) prepare a report to examine the way in which the military medical system trains for wartime and the

extent to which providing peacetime care contributes to that mission. The paper also studied the Department of Defense's ability to offer peacetime health care cost effectively, and offered several alternative approaches to military medical care which downsized the military's direct care system and increased collaboration with the civilian sector.

MHSS 2020

Military Health Services System (MHSS) 2020- Envisioning Tomorrow to focus Today's Resources, was created in 1996 with a diverse group of military and civilian participants. All services were represented in the multi phased study which was "chartered to create an ongoing process to explore long-term visioning and strategic requirements for the military health system." (p.8). Many forecasts and scenarios were developed, and predictions were made that military health will see continued movement towards an integrated defense health organization. A key result from this study was enabling participants to view the present differently, and gain skills and experience so they can influence the future versus reacting to it.

MHS 2025

MHS 2025 Toward a New Enterprise- A Report to the Senior Leadership of the Military Health System was created in 1999. This report was again a collaborative effort with participants from all services along with the Public Health service, VA and civilian sector. Scenarios were adapted and further developed from MHS 2020 (Global Mind Change, Turbulent Third Wave, Slow Decline and Dark Side) and the study included predictions of the World in 2025, National Security Mission, Health Innovation, Management and Organization and Leadership. Eight clear recommendations were made, with the central one again focusing on developing leaders with visionary capacity. This report also recommended the creation of a Joint integrated medical structure.

RAND 2001

The Under Secretary of Defense for Personnel and Readiness asked RAND to conduct a study required by the NDAA for FY 2000 reviewing the establishment of a Joint command, Joint training curriculum, and unified chain of command and budgeting authority. Five alternative organizational structures were considered to provide medical support to military operations and the comprehensive health benefit.

Roadmap for Medical Transformation- QDR

This report was published on 3 April 2006 by the Military Health System Office of Transformation. The paper identified 18 initiatives across four focus areas. Some of the initiatives were "transformational" and would require support of Congress, the Office of Management and Budget (OMB) and other stakeholders and some could be implemented within the Department of Defense using current laws and policies. Several relevant issues related the Group 1 in AMEDD 2039 fell under "Transform the Force", to include Interoperability and agility of operational

medicine capabilities, homeland defense and medical civil-military operations, and shaping the future joint medical force.

Defense Health Care- GAO

In October 2007, The U.S. Government Accountability Office produced a report to Congressional Committees titled Defense Health Care- DOD Needs to Address the Expected Benefits, Costs, and Risks for Its Newly Approved Medical Command Structure. In the report, the four options identified by the Joint/Unified Medical Command Working Group in April 2006 were studied, along with a fourth option presented in November 2006. The study of the fourth option led to the Center for Naval Analysis study on the cost implications of a unified medical command. The GAO study focused on the establishment of a unified medical command and questioned the DOD decision to go with option 4. Several recommendations were made for executive action.

Task Force on the Future of Military Health Care

The National Defense Authorization Act for Fiscal Year 2007 called for the establishment of a task force to study the future of military health care. The result was the December 2006 creation of the Task Force on the Future of Military health care. The TF was in existence through June 2008. Ten specific elements were addressed and recommendations made in their December 2007 report, Task Force on the Future of Military Health Care. Final Report from the subcommittee of the Defense Health Board.

The Joint Operating Environment- 2008

The Joint Forces Command produced The Joint Operating Environment (JOE)- 2008. The document is a "historically informed, forward-looking effort to discern most accurately the challenges we will face at the operational level of war." Trends influencing the World's security, the contextual world and the implications for the Joint Force are thoroughly examined. While the paper doesn't specifically address the future of the Military Health System, it is essential reading in order to consider how the MHS will fit into the future joint force and remain effective and adaptable.

Military Health System Strategic Plan

The Strategic plan is the examination of the fundamental purpose of the MHS, the vision for the future and the strategies to achieve that vision. The MHS leadership determined 10 strategic priorities for improvement, and discussed transformation in broad strategic terms.

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Appendix 2: The 2039 Health Care Model (VWG 2) Individual Papers

How will Patients be Empowered? - COL Richard "Ric" Ricciardi

How will patients be empowered?

The oxford dictionary defines patient as: a person receiving or registered to receive medical treatment. In 2039, no longer will patients be recipients of care; they will be the driver of their health care. Patients will receive the majority of information about their health (including both healthy and unhealthy signs, symptoms and behaviors) from an electronic dashboard linked up to some type of electronic screen located in their home, work or a type of phone device. Physiologic and psychological data and individual health behaviors will be captured daily from a wrist watch-like device (biosensors) and data will be sent to community IT Health Center. Health care professionals and IT health professionals and technicians will oversee large amounts of population data as well as review individual patient's data. Patients will be recipients of the translated electronic data which will be linked to their respective electronic health program/record. Health care professionals and IT health professionals and technicians will provide detailed algorithms to each patient and geographical communities with determinants of the levels of risk for health outcomes at the individual and community level. A patient's behavior and response to algorithms and health recommendations will be based on their own degree of risk taking and personal traits and thus, be based on how much health risk they are willing to tolerate. Patients will be empowered to make decisions on their health and held accountable for their behaviors and actions. Indeed, empower patients to have control of their health. Health outcomes will be the domain of each patient who will be *accountable and responsible* for those outcomes. In addition, patients will be part of geographical communities who as a whole will also be *accountable and responsible* for health outcomes. No longer will health care professionals be held solely responsible for treatment outcomes and/or prevention of disease.

How will the symbiotic relationship between a patient and his/her providers be strengthened by 2039?

Patients will receive daily translated data input regarding their signs, symptoms and health behaviors with recommendations from health care professionals working in tandem with IT health professionals and technicians on interventions to mitigate or eliminate health risks. A new health care provider called "IT health professional" will exist. Patients will have 24 hour electronic access to "IT health professionals" who will answer questions and provide clarity and education to individuals who are reviewing their health data and responding to health risks. The concept of a "medical home" will evolve to a "health IT home" in which patients and communities will take responsibility to drive their health outcomes.

The philosophical approach by the health care provider will need to shift when partnering with the empowered patient. Chiaramonte in a 2008 editorial in JAMA states, "Rather than being impressed by their patients' empowerment or inspired by their quest for wellness, some physicians are

suspicious and occasionally blatantly hostile toward patients who demand an active role in their health care. We physicians enjoy our kingdoms and we don't take kindly to challengers. Yet the occasional physician who embraces her patient's empowerment often discovers a gem—a patient who is engaged, adherent, and motivated to get well. A truly empowered patient is the ideal patient. Empowered patients will challenge us, yes, but they will also take their medicine and go for their tests. They will ask when they don't understand our instructions rather than simply ignoring them. And, most important, they will be more likely to get well, which will make us feel successful [1].

How big an impact will this have on health and disease management?

Health related outcomes and treatment of chronic diseases will be evaluated at the individual and community level. IT health professionals, systems engineers and novel technologies will allow for detailed analysis of patients health behaviors and adherence to treatments of acute and chronic diseases. Patients and communities will be incentivized to adhere to healthy lifestyles (health promotion behaviors) and treatment regimens.

Developing incentives for leading a healthy lifestyle will be complex and challenging.

One idea is that individuals and communities will have reduced taxes for good health outcomes, adherence to treatments and actively engaging in health promotion activities.

Many challenges will continue to exist in the management of health and chronic disease. Disparities in health care access and treatments will continue to exist. Vulnerable populations such as children, elderly (a large segment of the population in 2039) and patients with mental and physical deficits will require additional resources and innovative ways to promote prevention and treat chronic disease. A resurgence of the "house call" and public health nursing, medicine and robotics will attempt to fill that gap. Vulnerable populations and high risk individuals will be electronically linked to IT health professionals. A subset of IT health professions will be dedicated to patients with chronic mental health disease.

Biomedical ethical specialists and ethicists will become increasing important in the delivery of health care. Empowering patients with mental health disease, dementia, mental and physical disabilities and cognitive deficits will require novel approaches involving communities and families in the delivery of health care and promoting healthy behaviors.

"Best Practices" will move to evidenced-based community treatments, interventions and preventive methodologies as well as evaluating individual patient outcomes. The focus of local health agencies will be on community and population health rather than the individual's health.

What does a health care system with empowered patients in 2039 look like?

There will be major re-engineering in the 2009 model of health care delivery and reimbursement. Health promotion and prevention at the individual and community level will be an expectation and a measured outcome. The majority of patient's care will be directed through electronic methods with the patient being the center of the decision making process. Along with daily physiologic and

psychological data acquired through biosensors, patients will input and provide specific data to IT health professions on their evolving and or changing signs and symptoms through tele-technologies or video technologies via streamed electronic data. Many walk-in health clinics will be replaced by "IT-Health Clinics" located within the communities they serve and staffed by health care professionals and IT health professionals. Increasingly, hospitals will deliver care using robotics. Further, robotics will be prominent in the homes of patients with chronic diseases and in meeting the needs of vulnerable populations.

Advanced diagnostic capabilities either thru genomic, proteomic and/or metabolic testing will indentify patient's health risks. These risks will be detailed in a personal electronic profile for each patient – housed in the health care system and IT health clinics. Patients will have continuous access to their personal data and predicted outcomes. A personal algorithm or "best practice" will be developed for each individual and provide recommendations for health promotion and treatments. However, the patient will decide what and how they want to manage their care. Ongoing patient behaviors and physiologic data will be evaluated via IT methodologies and physiological and psychological health risks will be continuously assessed and updated. These activities will be aggregated to provide assessments of community health risks to community health care and legislative leaders.

Along with empowerment comes personal responsibility. Veatch states in his book published in 2009 that medical decisions in a patient centered health care delivery model will be based on patient's values and the system of the future will support the patient's decision in determining the trade-offs (risks versus benefits versus personal choice) depending on their personal perspective and wants [2]. Thus, individual patients and communities will assume more responsibility for their care and resulting health care outcomes. This new model of health care reformation will inspire and direct legislative and legal reform.

How important is this to AMEDD?

AMEDD will no longer exist in its current form and structure. A joint medical command will oversee the health care of DoD active duty beneficiaries. Retiree health care will be geographically focused and linked to "IT health communities" and be outsourced/ contracted by DoD. Active duty military personnel and their families will be part of the joint medical command with a centralized IT health care delivery system and local IT health communities. Commanders will receive reports and aggregate data on the physical and psychological health of active duty military personnel in their command. Geographically distributed community and tertiary care hospitals will provide necessary specialty and subspecialty health care.

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An Integrated Federal Health System in 2039 - Col Denise McCollum & Mr. Angel Padilla

Signposts

Several political, socio-economical and environmental signposts in 2009 were a forecast of the integration of the Federal health system by 2039. Some of the trends started before 2009. A recommendation from a forerunner of AMEDD Futures 2039, the *Military Health System 2025 – The New Enterprise* report written in 1999, saw the creation of a Federal Health System as an alternative for 2025[1].

The go-ahead for integration as of this date is fragmented, but in the right direction. Congress has mandated that the Department of Defense (DOD) and the Department of Veteran's Affairs (DVA) to share resources. This has been accelerated by the large number of casualties and types of injuries that Service members have been exposed in the Global War on Terrorism (GWT).[2]

President Barrack Obama in a news conference, with the Secretaries of Defense and Veteran's Affairs by his side, revealed the need for the creation of a seamless military health record to assure that Soldiers could get the care and benefits from the DVA without delay, after separation or retirement from the Service.[3]

The recommendations of the 2005 Base and Realignment Commission (BRAC) called for joint medical facilities. Over time more Service hospitals and health clinics were merged thus reducing the MHS footprint across the nation. Service rivalries and cultures clashed but finally accepted that merging was the right path to the future.[4]

In his radio address on 18 April 2009, the President announced that he is cutting unnecessary spending and trimming the budget deficit. That was the start for the Federal Health System, DoD, DVA, the Indian Health Service and other Federal health care delivery agencies to start looking at redundancies and for opportunities to increase sharing responsibilities.[5]

The quest for national health care reform and insurance initiatives continued to flourish, special interests continued to pressure the US Congress, and in the fall of 2011 a bill was passed creating a National Health Insurance Fund covering all citizens without health insurance while reducing the costs for those who could not afford it.[6]

The Need for Integration

The financial crisis of 2009 prompted the Federal Government to significantly trim the budget and reduce spending. Several ("Boston Tea Party") protests rallied across the nation, to show their displeasure of using Federal dollars to bail out failed commercial for profit entities.[7]
The President heard them and ordered all Cabinet Secretaries to look for redundancies and economies of scale to reduce the deficit created by two wars and the bailing out of several banking and industrial conglomerates to stimulate the economy.[8]

As a result, the President working with Congress, created legislation that directed the Secretary of Health and Human Services to consolidate all the Federal Health Services into one cohesive, seamless and efficient Federal health care organization in 2015.

A Symbiotic Relationship or a Synergystic System?

With substantial political opposition, initially from the VA, and later from DOD Health Affairs regarding placement of command and control for a unified organization, the Federal solution was to establish a brand new agency: The Military Health Care System (MHCS). The mission of the MHCS is to maintain health for current and former service members, promote military medical readiness, and provide the full range of health care services for military family members. Resources were obtained through the identification of property, program dollars, staffing tables, and management from the health care components formerly assigned to VA and the DOD. Under reorganization and reprogramming of these resources, a new appropriation was initiated: The Federal Health Program appropriation, or FHP. Utilizing best business practices and cutting edge information technologies, the MHCS stood up a standardized logistics system, acquisition process, and financial structure for efficient operations. FHP funding policies control the overall health care benefit to service members and their families, to include direct care and private sector care service options.

The MHCS manages the cost and quality of care provided to its patient population through the optimal employment of private and public health care providers. A major component for continuity of care is a universal medical record which must be utilized by all providers and accessible to patients and authorized medical service personnel. Similarly, all direct care and contract providers participate in MHCS clinical programs designed to promote quality, cost efficiency, and productivity.

Human capital management is a top priority for the MHCS. On the local level, the direct care staff mix consists of military personnel, civilian federal employees and contractors. The training, professional development and promotion of military and civilian staff members are carefully monitored and managed with the aid of tracking systems available to employees and their supervisors. Private sector providers are held to identical standards of training and experience as direct care providers though contract specifications.

The influx of technology savvy professionals, tweeters, face book and my page[9] generation of health professional workers, striving on communications and instant messaging systems became the catalysts for a cohesive and holistic Federal health care delivery system. They were disruptive[10] agents shaking the grounds of tradition and settling the grounds for a new and collaborative Federal health care environment focused on patient care rather than Service parochialism. They forced the MHS to look beyond the business as usual approach to a radical surgical innovative and futuristic mode where transparency and openness permeates through the system.

A Synergistic System

The forces of change prevailed and a more lean, efficient, effective and patient centered system is in effect. The business models were disrupted, Service rivalries came to an end and the cultures of the organizations adapted creating the healthy and collaborative environment in 2039.

By 2039 the National Federal Health Insurance System has matured. TRICARE has become the equivalent of the Federal Health Benefits Plan for the dependants of Service members and all care has been outsourced saving the Federal Government tax dollars and at the same time stimulating the economy.

The Integrated Federal Health System has also matured. AHLTA is a sign of the past, but was the precursor of a new and revolutionized medical records system. With centralized electronic health records systems, patients will carry their medical records in a micro chip inserted under the skin that contains their holistic medical history and is updated on every visit.

The application of technology to medical care, the change from reactive to proactive preventive and participating medicine, and advances in pre-disease management, a coordinated and integrated management coupled with a robust patient empowerment system made the Military Health System hospitals obsolete.

With less and more centralized military hospitals and a large number of outpatient clinics the MHS business process changed from a reactive system treating illnesses to a predictive, preventative, personalized and participatory one.[11]

By 2039 the Production Based Adjustment Model (PBAM) has become obsolete. The focus is not on treating but in an environment where solutions to complex medical problems and medical care and recovery are in a more resort type environment.[12]

Looking for efficiencies and promoting health rather than treating the MHS embraced the Solution Hospitals and Valued Added Clinics business processes.[13]

The paradigm shift from reactive to preventive medicine created a healthy environment freeing the health care providers to focus on team approach providing a holistic assessment and a coordinated treatment plan for the patients. Now the medical centers are solution shop hospitals, where an integrated team of specialists combine resources to offer test different treatment options (hypotheses) until a cure is found. [14]

Outpatient care has been revolutionized by the implementation of Value Added Hospitals and Clinics and more comfortable and relaxing recovering facilities expediting the return to normal life. These hospitals and clinics specialize in single procedures that when done over and over not only improves patient safety, but significantly reduces the risk of medical malpractice. [15]

A Seamless and Virtual Integrated Federal Health Care System

The success of the merge of the Naval Hospital Great Lakes (NHGL) and the North Chicago Veterans Administration Medical Center (NCVAMC) and the BRAC mandated fusion of Wilford Hall and Brooke medical centers in the San Antonio Military Medical Center North (SAMMCN) encouraged Congress and the President to work together and mandated the consolidation in 2015.[16]

The Services continue to maintain ownership of their uniformed health care professionals, whose numbers have been right-sized to meet operational contingencies. When military personnel are prematurely pulled from a MHCS assignment and temporarily deployed in support of worldwide missions, contracts are in place to backfill their functions on a one-for-one basis. Long-term assignments to operational units are balanced with rotations to fixed facilities, so unexpected departures of military personnel are more the exception than the rule. MHCS staffing also accommodates the readiness mission held by uniformed personnel. Extra civilian positions take up the slack around service members who need work time for individual training, field exercises, and personal readiness activities. Reserve and National Guard personnel strengths have been expanded in the medical specialties and those personnel are invited to serve on active duty in three year increments to supplement the MHCS clinical labor force. 20 and 30 year careers for health care service members have become less frequent as the mix of components becomes more fluid and traditional active duty personnel are intermixed with Compos 2 and 3.

The MHCS is geographically organized in the United States, with four regional HQs responsible for all the facilities and services in their geographic boundaries; and one regional HQs in Washington D.C. for overseas operations. Regional HQs manage patient enrollment and disenrollment, service planning and budgeting, employee recruitment and retention, and other operational activities. Agency HQs are also located in Washington D.C. From the patient's perspective, services are available locally through virtual care, home health care, and ambulatory clinics clustered around medical centers. Inpatient capacity is carefully placed in the medical centers according to population needs. Facility infrastructure is a combination of upgraded former DOD/VA medical buildings as well as leased medical and administrative space. The MHCS also contracts with vendors to invest in new medical construction and then lease back their facilities to the Government. Specialized deployment/redeployment centers have been designed for mobility in support of the service members en route to or from combat locations

Primary care providers and case management support personnel in the direct care system are responsible for the medical management of all military service members, to include referrals, readiness, and follow-up activities, to ensure continuity of care. For family members and retirees, primary care providers are assigned from both the direct care and the private sector components of the system. Credentialing activities for all providers and accreditation functions for all programs are centralized at MHCS HQs with the aid of knowledge systems and network research capabilities.

Support for continuing medical education, board licensure for providers, and refresher skill training for enlisted personnel is centrally managed at MHCS HQs under the Director for Medical Education. Training programs for military and civilian providers are designed to take advantage of the best programs available, inside or outside of the MHCS, through training partnerships. DOD and VA training programs have been combined, with an effective recruiting effort focused on universities and medical schools throughout the world.

In 2039 the hard-won combination of DOD and VA medical systems has eliminated a host of redundant efforts to serve Active Duty, Retired, Reserve and National Guard service members and their families. A flexible financial system has been established to adjust the individual sponsor's health care premiums according to his or her service status and associated benefit level. Facilities expansion, medical education and training opportunities, and specialty care are often leveraged from the private sector to achieve an optimal balance of services. Quality and value in patient care are achieved through this consolidation, which ultimately supports the health needs of every service member.

The integration of the Federal health system will be a seamless institution where all federal workers and Native Americans will receive health care at the nearest institution. The need for large hospitals will be reduced to regional solution shop hospitals and the need for inpatient care will be minimal. Recovery will be in, resort type facilities, where the patients will have a large variety of activities to engage reducing their recovery time while enhancing their whole mental and physical well being.

Outpatient care will be mostly remote. The use of telecommunications will improve and patients will log on and communicate with their avatars and, when necessary, their primary care managers on line.

AMEDD 2039

With an integrated Federal health system, the need for military health centers and hospitals will be limited and will focus to treat war casualties. Medical centers will be solution hospitals where teams will work with the Service members and provide a holistic solution to their medical needs. Outpatient medical care will be mostly virtual and colorless, all Service members and federal workers will be seen at the same facility. The visits at the value added clinics will be for same day outpatient procedures.

Advances in Medical Communications for Combat Casualty Care (MC4) and the continuous development of self care products for soldiers in the field will reduce the medical footprint in the battlefield. The Combat Support Hospitals and the energy consuming and waste generating units are things of the past.[17] This has lead the pace for leaner energy efficient and greener environment friendly Shop and Value Added Hospitals, significantly increasing the not only the survivability but at the same time the reduction of time loss of disease non battle injury casualties.
There is no doubt that the AMEDD will be leaner in 2039. The focus will be in conserving the "Fighting Strength".

Notes:

1. MHS 2025 – The New Enterprise. In the 90's the MHS put together a team to envision how the MHS would look in 2020, the enthusiasm kept it going to end looking at 2025.

2. PL 97-174 Title 38 Section 8111, 4 May 1982. This section directs DoD and VA to share resources to increase access and quality of care and to increase cost effectives while providing care to beneficiaries of both systems.

3. On 9 April President Obama announced the Department of Veterans Affairs will cooperate in creating a lifetime electronic health record called Joint Virtual Lifetime Electronic Health Record. Source CBS On Line News 9 April 2009. Posted by Michelle Levi.

4. Public Law 101-510, Department of Defense Authorization Act for 1991, established the Base Realignment and Closure Commission (BRAC). Since the several more have taken place the last one in 2005.

5. On his Radio Address to the Nation, President Obama mentioned that on his first full cabinet meeting he would ask the department heads to cut $100 million from budget. Posted on MSBC and reported in the Washington Post on Monday 20 April. Michael A. Fletcher and William Branigin contributed to the report.

6. The Commonwealth Fund Commission on a High Performance Health System, The Path to a High Performance U.S. Health System: A 2020 Vision of the Policies to Pave the Way, The Commonwealth Fund, February 2009.

The Associated Press on Sunday 19 April carried a press release with the headline: "Senators start work on crafting health care deal. Source MSNBC.

7. On 15 April 2009 across the Nation several grass roots organizations held rallies to protest government spending. Some events were carried live by Fox News Channel.

8. In his first cabinet meeting The President Ordered to reduce spending and look for savings to cut $100 million from Budget. The Washington Post on Monday 20 April. Michael A. Fletcher and William Branigin contributed to the report.

9. Tweeter is a text messaging system that allows posting messages thru Facebook. Facebook is a free social networking website that is operated and owned by Facebook inc. Mypage is an instant Web Page web plug in for static web pages. From MYpage.com.

10. The term "Disruptive" used as coined by Clayton M. Christensen, et al, In The Innovator's Prescription: A Disruptive Solution for Health Care, McGraw Hill, 2009. Introduction XII.

11. Barraza, Evelyn, Pre-disease and Prospective Medicine, paper submitted for the AMEDD Futures 2039 vision Group 2.

12. San Antonio Express News Article by Travis E. Polling, undated. A story where a 60 suite luxury suite recovery resort will be built in San Antonio.

13. The term "Solutions Hospitals and Value Added Clinics" used as described by Clayton M. Christensen, et al, In The Innovator's Prescription: A Disruptive Solution for Health Care, McGraw Hill, 2009.

14. Ibid.

15. Ibid.
16. "Chicago Partnership Breaks VA DoD Mold". Stephen Spotswood, Military Medicine, October 2006.

16a. 2005 Base Closure and Realignment Commission Recommendations.

17. In April of 2009 USA MEDCOM launched a MEDCOM Green, sustainability program. Some facilities are already engaged in the process. MAMC for example uses leftovers to create compost.

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2. Public Law 97-174 Title 38 Section 8111, 4 May 1982. This section directs DoD and VA to share resources to increase access and quality of care and to increase cost effectiveness while providing care to beneficiaries of both systems

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Where Will Health Services be Delivered in 2039? – Dr. William Rowley

Health care will advance and change the way we live over the next 30 years. How will these changes affect where health care services are delivered? Starting with profound changes and working backward this research will explore what could happen to our traditional venues of care and the impact on health system design and facilities planning.

Forecasts for Health Services Venues in 2039

Embedded Auto-Health Management

In 2039 much of an individual's health management is done automatically through implanted and remote sensors and devices that monitor health status and intervene as appropriate. Various biomonitors keep track of important physiologic parameters of health and disease, sending information to the individual's ultra intelligent Health Advocate AVATAR for tracking and action as necessary. Devices that are implanted or worn administer therapies as needed to maintain health or manage diseases such as diabetes. Nanobots within the body can go to the site of disease or injury to correct the problem and can destroy pathogens or toxins that enter the body. Maybe nanobots will be designed to vigilantly look for precancer cells to either repair or remove, preventing most cancers from starting. The individual's AVATAR is in charge under the controls mentioned in the next section.

Cyberspace as the Primary Portal for Health and Disease Management

Knowledge technologies in virtual reality are the preferred source in 2039 for health services anytime, anywhere for almost any need. People have long depended upon the virtual web for achieving many of the tasks and activities of daily life. So they feel totally comfortable using this venue for most health interventions.

The individual's AVATAR, as the personal agent tied to her integrated health system, is the key navigator in this limitless medium for accessing knowledge, services, support, and therapies. The AVATAR brings everything together – biosensing data, smart agent delivered interventions, longitudinal records, and the latest health knowledge. Its machine intelligence learns from experience and its compelling user interface is very effective in providing coaching for its master. The AVATAR has built in fail safe controls, is guided by the master's preference directives, and operates under the direction of the health team of professionals through the health system knowledge manager. However, the individual is the ultimate master in control of her AVATAR (but it is programmed to do no harm).

People turn first to cyberhealth for a solution whenever there is a health issue. Real time communication with the AVATAR or even a living doctor is possible anytime from anywhere. Customer service in cyberspace is instantaneous and superb, and communications with a plethora of devices permit biomonitoring, bioimaging, and many therapies anyplace with remote professional

management and control. A key component to health is virtual communications with "people like me" who can provide truly personal advice and emotional support based on prior similar experiences with the malady being addressed at the moment.

Home Self-Care

"Aging in place" has become the major demand that an aging population places on health care in 2039. Much attention was directed toward creating information technologies, assistive devices, and robotics to permit people to maintain their independence while ensuring safe, high quality of life. It has become rare for even the most impaired seniors to require an assisted living facility on a long term basis.

Convenient Ambulatory Health Venues

Ambulatory settings in the early 21st century standardized processes at high volumes, permitting better outcomes than hospitals at much lower cost. Then the disruptive business model of customer-focused retail clinics and work site clinics forever changed delivery by driving competition on convenience and customer satisfaction at dramatically reduced costs. However, by the 2020s the ambulatory center model peaked as more things could be done at home or in cyberspace.

Residential Facilities

A few regional residential health facilities remain where there is the support and expertise necessary to guide a person through extensive rehabilitation, to safely manage a severe mental illness or to provide long term care for someone with advanced Alzheimer's disease. But the need was dramatically reduced with advances in remote monitoring and robotic and assistive technologies that permitted safe recovery or care at home.

Hospitals Play a Limited, but Vital Role

In 2039 there are a few high capacity regionally distributed medical centers. These hospitals provide sophisticated diagnostic and therapeutic services and intensive therapies for those with extensive trauma and severe multisystem diseases. As new classes of complex therapies develop, such as regenerative organ transplants, regional research centers of excellence do the experimental work, testing and evaluation. Only after the processes are well established does delivery shift to regional specialty ambulatory facilities, with rigorous training and certification for providers. Then the new techniques often diffuse to providers' offices or are even performed remotely at home.

The infrastructure, equipment and staff of these regional hospitals are so expensive that all health systems in the area come together to share in the investment and management (including the Military and veteran Affairs). Facilities in 2039 are designed to create a patient and staff centered healing environment. These facilities also house research into new diseases as well as experimental

therapies. The buildings are energy neutral and environmentally friendly with aesthetics that suit their role as learning centers for health care.

The Integrated Health System

Systemness with networked knowledge technologies brings all the disparate venues of health services together into an integrated whole serving individuals and the health of the whole community. The AVATAR is the user interface dedicated to the individual's health. There is also a similar population AVATAR serving public health providers to monitor and improve the health of the entire community.

The Healthy Living Environment

The ultimate venue for health creation in 2039 is a society dedicated to providing the milieu for healthy living and emotional support in families, neighborhoods and communities. This milieu includes the built environment which provides for varied safe physical activity, access to healthy food, clean air, and water free of pollutants and toxins. Societal interventions eliminate health disparities and provide emotional well being. All components of the community have a responsibility to achieve individual and societal health. This fundamental change in American thinking and values led to community public health systems that were chartered to be responsible for population health. These community health systems are reimbursed by a per-population, per-month (pp/pm) payment system which incentivizes them to invest in ways to keep the community healthy. They contract with integrated health systems for health care of the community's citizens.

Recommendations for AMEDD

Military Medicine is in the unique position to have the systemness, talent and leadership to lead the way in creating a convenient, customer focused, technology enabled, integrated platform for creating health while effectively managing illness. The Military and Veterans Affairs could develop the Health Advocate AVATAR in order to advance health knowledge technologies. As an integrated system the military can provide an array of delivery venues with systemness and convenient navigation for its people. Military system designers and facility planners can create superb future systems of delivery and design the buildings that embrace this future, rather than locking buildings and therefore delivery in past paradigms. These facilities will have to be as flexible as possible because future innovations cannot be fully anticipated now. Military leaders should boldly reach out to Sister Services, the Department of Veterans Affairs and even private sector providers to create regional collaborations with shared facilities to prevent the stove piped duplication of expensive underutilized facilities of the past. As care shifts to the home and cyberspace the Military will benefit from being the leaders in creating world class health.

Alternative Forecast For Facility-based Health Care

The big unknown is whether society will embrace the shift toward creating health through shared community, health system, and individual responsibility. The alternative forecast is for increasing reliance on technology placed in hospitals and designed to treat end stage disease. Costs will continue to rise and the allure of fighting against death will create high demand in a population that is older and sicker in 2039. Budgets will overrun the willingness to pay, and policy makers will continually try to squeeze vulnerable facilities, especially those that serve the poor and disenfranchised. Military health budgets will go through boom and bust cycles that leave them farther and farther behind the top tier civilian hospitals which have the latest technologies. The high cost of health care, military as well as civilian, pulls resources that could be spent on national security and economic productivity, but the public is still not ready to tackle the problem.

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Pre-disease Management - COL Evelyn Barraza & LTC Patricia McKinney

Pre-disease and Prospective Medicine

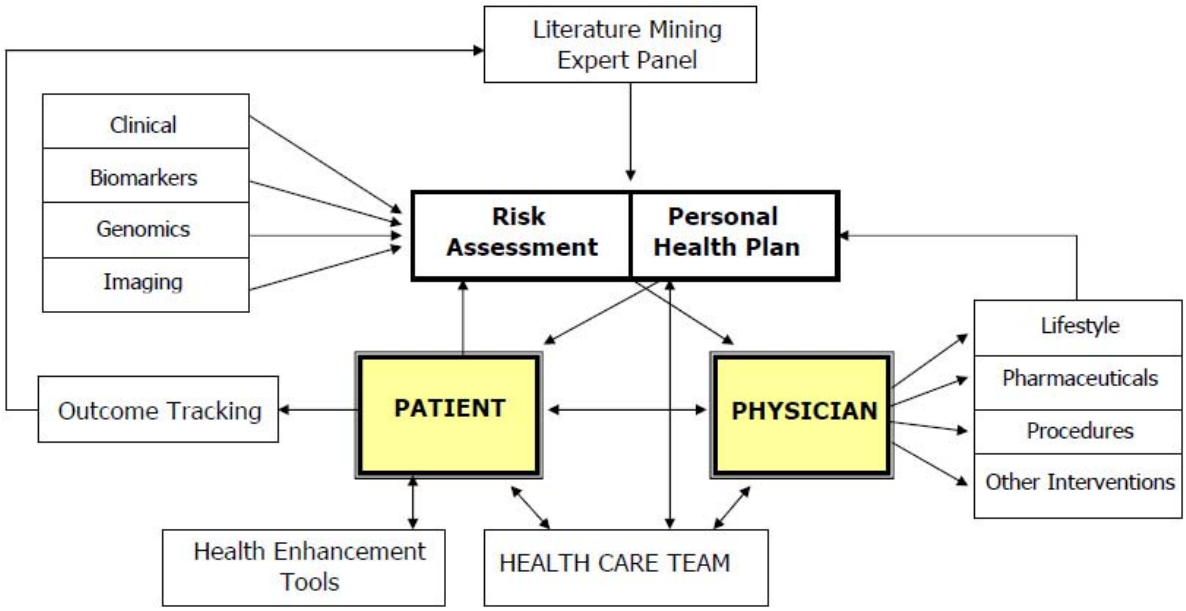
By 2039, the United States health care system has transformed to a functional prospective system. Clinical medicine underwent this paradigm shift from disease-oriented and reactive medicine to a prospective health care approach that embodies the 4 Ps of *predictive, preventive, personalized and participatory* medicine. Technology can now more accurately forecast an individual's health with predictive models, biomarkers and genetic data that quantitatively determine the risks for developing certain conditions and reduce the morbidity and mortality of chronic diseases.

Prospective medicine is the early identification of pathologic or potentially pathologic processes and the prescription of interventions to stop them. The increased power of medicine to predict susceptibility to specific diseases in 2039, led to the development of strategic personalized health plans by physicians and patients to prevent, delay, or alleviate both current and high risk conditions early enough to provide maximum benefit. Pre-disease management allows for individually tailored interventions and targeted treatments with preventive or disease-delaying medicine.

Patients are now more participatory in the management of their health care, partnering with medical providers on new diagnostic and treatment choices that are proactive rather than reactive. A focus on wellness emerged with the progress of prospective medicine, with highly effective strategies designed to help people maintain or improve their health status and quality of life. The new culture of wellness made health a fundamental priority incorporated into all components of everyday life – homes, schools, workplace, communities, etc. Organized, effective and outcome-based wellness programs are in place in many settings, to include the military, using the techniques of prospective medicine.

State-of-the-art and validated Health Risk Assessment (HRA) tools are widely available in the United States. An HRA incorporates lifestyle, health histories, clinical, biomarkers and genetic data to quantify a person's health risks and serves as the basis for developing strategic personalized health plans. Providers and patients receive customized reports on an annual basis to drive wellness, diagnostic, and treatment decisions. This personalized information directs alterations in lifestyle, behaviors, and medical care. Individuals get instructions on exercise prescriptions, caloric requirements and other lifestyle changes that will modify his or her risk factors. Medical providers utilize the HRA to deliver effective and personalized health care aimed at preventive or early interventions and selective treatments. The figure below depicts the model for personalized health management in 2039 (ref 1).

Model for Personalized Health Management



Identification, Prevention and Treatment of Pre-disease.

Emerging technologies during the early 21st century will result in an explosion of information and resources for effective pre-disease management. Large knowledge banks of population, disease, genomic and other key data are available through the collaboration of medical, government, corporate, research and pharmaceutical enterprises. Integrated systems increase the forecasting accuracy and modeling of the health risk assessment tools. Sequencing of a person's genome will be readily available in 2039 and incorporated into their personalized health plan. This will help identify high-risk individuals for intensive short and long term surveillance and permit aggressive application of preventive strategies at preclinical stages of disease. Armed with this information, medical providers effectively prescribe personal screening schedules, specific preventive measures, and early treatment that go well beyond the realm of cancer or cardiovascular disease management. Genomic information is utilized to predict responses to certain drugs and environmental substances permitting the production of cost-effective pharmaceuticals with reduced toxicities. Providers will experience a wave of increased patient compliance and response to drug treatments.

Following the tremendous success of cancer nanotechnology programs to detect, diagnosis and treat cancerous changes, other pre-disease applications for nanodevices are being widely used in 2039. The medical provider follows detailed risk information from an individual's HRA to prescribe the use of nanodevices to survey organ systems for precancerous and other early disease changes within the body. Nanomedicine will have the capability for perfectly targeted and individualized treatments that diagnose and treat pre-disease and early disease abnormalities on a cell by cell basis with precise dosing and monitoring through biomolecular sensors. Nanoparticles designed to travel through the bloodstream will pinpoint disease, tumors, arterial plaques and other changes deep within the body

undetectable by current conventional methods. Physicians will then be able to deliver drugs and other treatments exactly where they are needed for optimal results and minimal adverse effects.

In 2039, there are numerous biomarkers on the market that can detect the genetic, proteomic, metabolomic and other abnormalities that indicate the earliest changes leading to disease. Followed over time, specific patterns of abnormalities more precisely forecast specific diseases. The advanced and multiple information streams about a patient's health status and risks will encompass a change in the routine physician-patient relationship. For pre-disease management, the medical provider/physician's primary role is to review the health risk assessment report and confirm or modify the recommendations generated by the data systems. After the medical provider's assessment, communication with the patient will be driven by individual interactions with the advanced information systems and other health support teams. Predictive biosensors and systems for monitoring in the home will push patient participation by providing direct and measurable feedback. Wellness centers located at worksites, schools and communities are focal points for the delivery of pre-disease interventions both preventive and early management. These facilities are major interlinks between the medical care team and individual patients, ensuring risk information is current, health surveillance measures are tracked, and interventions are executed and modified as needed.

Creating Super-healthy Soldiers?

The wave of effective and efficient pre-disease management will be aggressively applied to warrior health care in 2039. On accession to the military, all Soldiers will have their genetic profile recorded in the medical database. Modified accession standards incorporate the disease risk profile generated through clinical, metabolic and genomic intelligence. Critical decisions are made in regards to "acceptable risk profiles" for new Soldiers based on the needs of the military and executable interventions. For active warriors, strategic personalized health plans are developed to maximize individual health and performance. Through state-of-the-art wellness and fitness programs, military medicine delivers uniquely tailored interventions to prevent, delay, or alleviate current and high risk conditions. Physicians prescribe selective treatments with preventive or disease-delaying medicine, procedures or nanodevices to alter a Soldier's risk profile and eliminate or drastically reduce the development of many clinical diseases. Biosensors and other monitoring devices are required for all warriors to inform their health care teams of abnormalities that can be readily managed before the onset of noticeable symptoms or impact to the warrior's performance – both on and off the battlefield.

The wealth of informatics in the military has created one of the most accurate and widely applied health risk forecasting system in the country. The Department of Defense is heavily invested in the use of genomics and nanotechnology to enhance the health, wellness and fitness of the force. Is a super-healthy Soldier a reality in 2039? Will recruitment only focus on individuals with low risk profiles? What will be the Soldier's personal responsibilities for interventions that can alter their risk profile? How much will be a corporate responsibility? Will the military mandate adherence to personalized health plans and selective treatments? Are Soldier's released if they fail to follow recommended therapies?

Importance to the Army Medical Department

In 2039, the U.S. Military has restructured and refocused its health care system to embrace the prospective medicine approach. Military medicine is well entrenched in the application of pre-disease management tools and is on the fore-front of risk modifying interventions. Priority has shifted from treatment of disease to risk forecasting and prevention. In support of the War-Fighter, the AMEDD has made available a host of interventions to enhance the performance and combat effectiveness of the force. Many diseases and injuries are now prevented, modified or detected and treated early.

It is clear that a paradigm shift to a broad-based prospective health care system will have major impact on the Army Medical Department. Effective detection and management of pre-disease will eventually eliminate most clinical diseases and revolutionize the use of pharmaceuticals, impacting the need for hospitals and treatment centers. Medical education will be affected by the decreasing frequency of certain diseases and will become centered on the utility of informatics and nanotechnology. Medicine will be driven more by sophisticated information systems and the use of genomic, metabolic and nanotechnology data. How far will we go with advancing predictive medicine? Who will determine the cost-effectiveness of interventions and the extent they are applied to the Warrior Force? What will be the funding priorities?

Conclusion

Prospective medicine and a sophisticated repertoire of pre-disease interventions will transform the U.S. health care system by 2039. Detailed risk forecasting, nanotechnology, genomics and gene therapy will be routine and dramatically impact disease morbidity and mortality. Hundreds of diseases will be completely preventable or curable. If we understand the true underlying etiology of diseases, can some diseases be engineered out of society or at least from the military? How will the myriad of ethical and financial issues be handled that arise from this new power of medicine? How will non-compliance with available interventions be addressed? How will society respond to individuals who refuse to change lifestyles and high risk behaviors or are not-compliant with treatment? Who will bear the burden of their care and disability? How will the tremendous amount of personal information be managed, secured and utilized? How far should we go with biosensors and monitoring devices? Finally, how will all this be funded?

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How Will the Health of an Individual be Coordinated and Integrated in 2039? - LTC Jennie Irizarry & SFC Daniel Watford

The coordination of an individual's health care has evolved throughout the years due to the longevity of society. Health care was delivered in a disjointed manner followed by a lack of coordination for disease management and prevention. With the evolution of technology health care will be individualize and patient centered in the year 2039. People receive medication, rehab, advice and medical reminders in the privacy of their own home. Personal avatars, 3D visual or voice only (IAW user preference) act as intelligent medical and social butlers. They are completely interactive and liaisons with primary care providers (PCM). How will health care be coordinated and integrated in 2039? Who will be responsible for it: the patient, the provider, the system? These are some of the questions this research will look at. How could our current fragmented care be integrated through a synchronize team and the utilization of technology? The challenge of how this concept will be incorporated into military medicine is yet to come.

Health Care Team

In 2039 an individual's health is managed in a synchronize way with the participation of the patient and personal avatar with a cohesive team assigned for acute medical care. There is a difference between the chronic, the acute, and the healthy individual. Healthy and acute patients are managed from home with the assistance of the Health Care Team: a physician, nurse, care coordinator and Avatar depending on the needs of the individual. The physician and the nurse are responsible to encourage behavior change to healthy lifestyles, reinforce compliance with therapy and wellness evaluations, address physical, emotional, and other issues. The care coordinator knows the patient's health needs and integrates all the services provided to appropriately manage the individual's health. The coordinator maintains close contact with individual, physician, and nurse in order to achieve a seamless process. The Avatar is in charge of managing the patient's needs from home and responsible for managing the technology involved in delivering health care; also it assist with the process of billing and financial issues. Overall, the Team is responsible for educating and monitoring the patient's health and to assist family members when needed, however the individual is ultimately responsible for his/her health.

Healthy patients manage their health and medical needs from home with the assistance of their personal avatar and care coordinator as needed. The avatar is capable of being interactive. It detects motions and can differentiate between persons. Medically applicable preferences are set by the user, but can be augmented by the any member of the team based on temperamental and cognitive need. The avatar is responsible for encouraging behavior change to healthy lifestyles, reinforcing compliance with therapy and wellness evaluations, and addressing physical, emotional, and other issues. The avatar knows the patient's health needs and integrates all the services provided to appropriately manage the individual's health. The avatar is satellite linked to a central data base system, is accessible by assigned health care professionals and the linked knowledge system stores and updates personal data as it becomes available. This eliminates unnecessary travel for self-based care. The Avatar is also capable of processing billing and exposing financial issues to the patient.

Overall the avatar is responsible to educate and monitor the patient's health, per the primary care providers input. However the individual is the ultimate responsible for his/her health.

The patient with chronic diseases requires closer follow-up by the care coordinator and the avatar for issues from medications to life style. If the patient requires an admission to a hospital setting, the care coordinator is responsible to set it up and monitor the patient until discharge. After discharge the avatar will continue the monitoring.

Patient Home-Centered

In 2039 individuals in need of acute care are treated in a traditional manner with a cyberspace component. Inpatient services are reserved for a sudden change in condition or severe chronic care issues. Following the change in health status and recovery the patient is released to manage remainder of his/her health needs from home. Through the assistance of the Avatar the individual communicates, via data upload, with the provider (physician or nurse). The individual's symptoms can be readily assessed by avatar directed monitoring at scheduled times or anytime through the remote request of the provider and viewed in the electronic record in real time. The individual schedules virtual follow-up appointments, avatar based test and orders medications thru via the avatar. The care coordinator monitors further health issues not resolved by the avatar. This approach of managed health care is beneficial for the individual and cost effective for society.

Hospital Setting

A few regionally distributed high capacity are available mainly for chronically ill patients, especially those with severe multiple diseases. Trauma patients are included in this category as well. These individuals are difficult to manage, therefore the Health Care Team works very closely with the hospital staff to achieve a prompt recovery. Further follow-ups are done through the avatar at home or rarely through placement in long- term facilities.

Long Term Facilities

Individuals are living longer and sometimes require nursing homes and assisted living facilities if they can no longer "age in place" with technological assistance at home. The transition from the home to this type of facilities is seamless with the assistance of the care coordinator and avatar. Once the coordination is done the avatar takes over care. Semi-sentient robotics, which serve in harmony with the 3D holographic avatar are made available to support the patient and control personnel expenses. These robots are provided at no cost, to individuals with a history of compliance with their recommended healthcare plan. Others are charged a fee that is slightly higher than for their normal avatar. Advances in technology assisted home care make the need for nursing homes and assisted living facilities quite rare compared to the past.

How does this affect military medicine?

The military likes to communicate via acronyms, so let's call the previously mentioned avatar a Domicile Assistant Medical Avatar (DAMA). This system was further modified to meet the lifestyle needs of service members. Portability and the rigors of combat had to be addressed. So warriors receive a military issued communicator (voice activated smart phone interface – VASPI). The program created to run the DAMA later served as the basis for the Military grade VASPI. It serves as a portable voice only DAMA for the same reminders of medically oriented advice and information. The DAMA and VASPI can be seamlessly linked for a small monthly connect fee considering their information comes from the same database. A Medical Avatar Assistance Monitor (MAAM) digitally schedules, tracks, and updates Warrior data. Avatar assistance alleviates most of the need for Administrative Assistants (AA). AA's are replaced with medical maintenance and medical record clerk supervisors to serve as a "checks and balance" structure in the unlikely instance of system failure. A sister program houses historical data and experimental procedures still in the research phase to be referenced should a PCM require it. In this digital age, physicians are utilizing Medical Holography for research preparation and to aid in patient interaction. All self-aid and avatar capable consultations are conducted via that medium, limiting face to face necessity. Face to face consultations are facilitated via the MAAM directly through the DAMA or VASPI reducing travel and wait times. Warrior medics, who replaced the Army's 68W, have scanners that are linked to MAAM should the patient's injury or illness preclude them from making a self referral (unconscious or unaware of the specific injury).

History

"Warrior Medics" is the common name for the Defense Military Medical Department's (DMEDD) combat medic. It was agreed upon, shortly after AMEDD Futures 2039 project, that the AMEDD should combine with its sister services in one joint medical department. This made joint combat and garrison missions uncomplicated. It streamlined administrative tracking and filing, unified common knowledge and vocabulary, and essentially destroyed the stigma of "better" medical service in one branch vs. another.

There was a draw down within the military following the Global War on Terrorism. The government offered increased incentives and assistance with finding comparable civilian jobs to prevent unemployment. The DMEDD numbers reduced drastically due to the draw down. Some medical military occupational specialties (MOS) were merged or deleted all together or replaced by DAMA and VASPI. Advanced Individual Training cycle curriculums were increased allowing for more certifications and or degrees before being assigned to any unit escalating the military's appeal to the civilian populace. United States Recruiting Command was able to reduce its required numbers of recruiters. Recruiting was no longer seen as one of the most stressful assignments in the military allowing them to become an all voluntary assignment.

History Repeats It's Self

Disaster hits (you name it – war, natural disaster, terrorist attack, etc.) and the military must be transitioned back to a war fighting posture. Yet again, mission tugs on the numbers and pulls the military in different directions. Inevitability, recruiting needs increase. Pivotal military medical specialties which were once individualized are now lost under melded job titles/ specialties and technologically supported systems. We find that cost associated with DAMA's and VASPI's are too expensive and fragile for the rigors of combat, and warrior medics are expected to act in line unit capacities. It is deemed that this is an unrealistic expectation and that certain MOS's should be revived. However, the American populace has become expectant of an Advance Individual Training (AIT) that yields degrees and or certifications that make one marketable. The AIT's of these once forgotten medically based MOS's fall short of this expectation. Therefore these pivotal lost MOS's are merged with similar specialties to make one resulting in a new degree, at the associate level: Warrior Medics who meet the needs of a nation at war and a business minded employee.

Recommendations for AMEDD

Health care delivery must be coordinated in a synchronized way to maintain a healthy population. The individual's needs are to be addressed from the beginning of the disease process all the way to the recovery and the maintenance of health. Prevention is a crucial part of this process. Military Medicine has the capacity to influence other systems through their leaders and the advance usage of technology. Pilot projects between DMEDD, Veterans Affairs, and the community could be developed to evaluate the efficiency and efficacy of these projects. Through high technology accessibility of electronic medical record should be available across the nation and made compatible so they also work at all civilian facilities.

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Appendix 3: Healthy Communities (VWG 3) Individual Papers

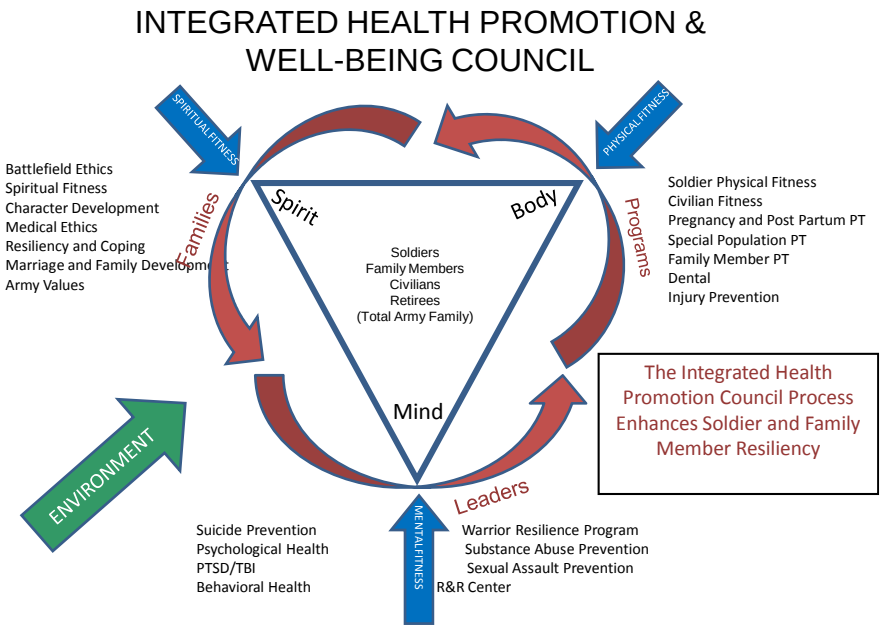
Building Community Coalitions for Health – Anna Courie

Guiding Principle: "Each community has unique needs, concerns, and resources. Previous experience tells us local coalitions will translate national and state goals into reality"—Anderson-Woods 2008

For example: What we develop on the local Army installation can translate to health processes for the Army as a whole.

What is Health?

What is health? Health is complex phenomenon impacting mind, body, spiritual and material well being. These complex systems interact in which the client perceives these systems in being at such a balance that they consider themselves as healthy. When you look at health as a complex phenomenon outside of the traditional medical model, you begin to realize that truly impacting the health and wellness of a community may take many different professionals from a multi-disciplinary perspective to truly set a course for community well being.
Figure 1:



Army coalitions or Health Promotion Councils can be the venue for ensuring the holistic wellness of the Army installation. Rather than working groups that focus on individual risk factors, the future

of the Army coalition will be to work as the Senior Commander's Master Facilitator and Strategic Planner for the health and well being of the total community. The Army is moving to such a structure as well, in which health promotion is no longer confined within the walls of the MTF and instead is stepping out of the hospital walls into the forum of FORSCOM and IMCOM assets to improve the health and wellness of Soldiers, Family Members and Civilians. The coalitions are called Community Health Promotion Councils and are facilitated by a Health Promotion Officer that serves as special staff to the Senior Commander. As a result, the need for professionals with a complex orientation of facilitation skills is required to integrate medical, tactical and garrison assets in such a way that the Army is ensuring the long term health and wellness of its installations. These officers will need to be trained as facilitators, consultants and coordinators and it is necessary that these individuals function at a high level of expertise that brings out the best characteristics and strengths of different personalities work at the table. These Master Facilitators must be civilians and remain as objective as possible and outside of traditional chains of command. They should report directly to the SC, but also be able to provide recommendations and suggestions to the SC without fear of reprisal. The officers have the ability to take the long range mission of the Senior Commander and the Army and turn this into a strategic plan for health for the installation through integration of resources.

Consequently, the current mission of the Health Promotion Council (i.e. coalition) is to identify gaps and overlaps in health promotion and well being services and provide targeted interventions based on the risk factors of the population.

As this process grows over the next 10 years, all health and well being assets will be included under the umbrella of the Community Health Promotion Council. Research indicates that complex, diverse coalitions from various community agencies are successful in developing integrated and creative plans for dealing with the complex health and wellness needs of a community. As the Council process matures, the Community Health Promotion Council will be the avenue in which all agencies work together to reduce stove-piping (and thus save money) for the Commander's plan for Soldier and Family Member Well Being. Under the direction of the Senior Commander, this leader has the tools and subject matter experts to focus resources to the indicated health priorities of his/her community. Additionally, since all these agencies will fall under the same umbrella, this allows the Senior Commander to direct command and control of installations resources towards programs and processes that will impact the health disparities indicated in the data analysis. By developing this chain through the council it requires agencies out of the same command and control structure to work together as directed by the Senior Commander's Strategic Plan. Ideally, resource allocation will be directed at this process and will reduce the proliferation of spending based on a "good idea" versus processes that are a result of identified risks as well as best practices identified in the literature. Rather than throwing money at individual risk factors such as suicide, tobacco, drug, alcohol, etc, money would be allocated towards a holistic wellness plan that strategically identifies risks for the community, leverages resources and build potential structures for mitigating problems rather than just reacting to the existing problem.

In 2019, the mission of the council will grow as the capabilities of the council as a whole grows. As relationships mature and the understanding of the holistic wellness of the community deepens, the strategic plan of the health of the community can broaden to include developing strategies that build community resilience and health and not just focus on the illness and disease risk factors. As we become smarter about coalition building, the relationships and synergy between the systems also mature in which redundancies and waste are reduced. This will include moving from risk factor

intervention to Human Performance Optimization on the mind, body and physical levels. Integrated use of subject matter experts from all disciplines will work with the Senior Commander on developing holistic training plans that incorporate mission readiness needs into the physical training of the warrior. Army wide standards will become less prescriptive and allow more flexibility for individualizing the health and wellness needs of Army installations based on the interacting systems within the installation and surrounding community.

As the future develops, additional systems that impact health would be added to the model. From 2029-2039, we would also add a "technological health" area as an impact to the community/system as a whole. For example, the impact of technological warfare on the war fighter is just beginning to be explored. The ramifications of methodological changes in how the Army interacts globally, will also result in necessary changes in the local community to support this impact. If PTSD has the potential to increase in severity as a result of technological killing, then a multidisciplinary process is essentially needed to modify the ramifications of this protocol change.

This model allows for flexibility in community needs and priorities as evidenced by the Community Specific Concerns area of the framework. This allows commanders to focus on health priorities that may be a grassroots issue and not just an issue for the Army as a larger organization. As coalitions grow and build, trust develops. Additionally, leadership abilities and the creative process continues to be fostered which allows the facilitator to use the process to whatever the needs of the community would be at any given time in the future. Creative processes and interaction foster varying methodologies that are combined in ways that promote interaction across silos so they are directed toward health impact. This method of creativity and combined resourcing also allows for agencies in various command structures to create and develop best practice models that can be shared throughout the chain of command and propel standardized proliferation throughout the Army. In ten years, we will have matured this process that allows for a Senior Level Council on higher headquarters levels at FORSCOM and/or DA which will allow these best practices to be fed up the chain of command to impact the governing structure of the Army. Additionally, with higher headquarters visibility, true best practices can be fed down the chain of command as well which improves the common levels of support that can be found from installation to installation.

If we do not take this opportunity to develop command and control relationships, then stove-piping ensues. This is a long time concern of the Army of how duplication of efforts across command lines continues to happen. This will continue to occur if we do not formulate a process in which existing agencies and support staff are not facilitated in a method in which resourcing is combined towards the identified risk factors for a community.

What is the Military Installation of the Future?

When you look at military communities, it is difficult to define them within the scope of all military installations look like "x, y, z". To theoretically define a military community would be to make the erroneous assumption that each military community has the same community characteristics. While you may be able to make broad generalizations about military communities, they are individual systems influenced by the scope of the community surrounding the installation as well as the financial, sociological and cultural impacts of the surrounding land.

Since the Army stopped using the Health Enrollment Assessment Review (HEAR) HRA, we lost the ability to aggregate data on military installations in an easy manner in order to identify priorities. We additionally lost the ability to identify illness/potential health risk factors for our clients and efficiently direct them to the required services. Current trends utilize the DoD Survey of Health Related Risk Factors in order to identify risks and other stove-piped surveying methods, but this does not allow us to focus on the community level risk factors and thus programming. The MEDCOM does has plans for querying CHCS II and/or AHLTA for community level aggregate data, but every day/year that goes by that we are unable to do this, we lose the historical perspective of how the community has changed as a result of our actions on the Community and Army levels. It has been 5 years since the HEAR survey was disbanded, which correlates to 5 years worth of lost data.

In the next 10years, it is going to be necessary to really flesh out the technological capabilities of MEDCOM to assess a community health status based on the individuals that are in residence at any given time. We will need to be able to track these health records more easily as soldiers and Family Members move from installation to installation. One could anticipate that the individual's entire health history would be included on their ID Card, or through biometric scanning so that as an individual signs into an installation, their health history is then incorporated into the overall aggregate health data of a community. This information can also be used to 1) direct the individual to the correct health professional based on their health status as well as resources available to maximize wellness and readiness and 2) provide a population based health profile of the installation. As units move around, this would also help to identify at risk units from installation to installation. This way, we can track an installations health change over time as well as the individuals for better prescriptive ability as well as identifying trends in order for the Community Health Promotion Council to set its priorities for a given period of time. Say we utilize the ID card for all TRICARE beneficiaries as the means for transferring health information/status to each installation as individuals move, then we will need to leverage technology that an up to date HRA is stored on each person's ID card and every time that ID card is updated, or a person moves, the individual will fill out a new health status report. MEDCOM will then be able to access the population health statistics of an installation on real-time points as that information moves each time individuals sign in and out of a stationing. Installations will be able to query their own health status information through aggregate information on a consolidated data based that pulls data sets from the health information stored on all ID cards.

In 2029, the HP Council will have developed in such a way, that resource allocation will solely be based on installation level needs for force and Army family needs to function at the highest level of health. Because the technological ability of the Army will have matured to a point that we can identify a community's health needs based on the aggregate medical information on the members of the community, we will then be able to place assets based on a community's statistics rather than the statistics of the Army as a whole. Common Levels of Support will not be based on ASIP numbers only, but also be the risk factors and health status that is tracked within the multi-disciplinary forum of the council. In fact, if we develop an algorithm of resource allocation by how much certain "risks cost" then we will have proliferated a far more economical means of utilizing support agencies for soldiers needs, not just their physical presence.

Ultimately, our coalitions will be able to deliver targeted interventions on the individual, community and organizational level and utilize the process and the upward and downward information throughout the chain of integrated services. These coalitions will also need to reach out to external

community systems either for additional medical support as our active duty individuals are deployed on medical missions, or in order to provide opportunities for the AD individuals to maintain medical board requirements in their field of expertise.

Without the integration of services throughout the command and control chain, efficiency and quality of services is reduced. When complex systems interact, the potential for explosive interactions increase resulting in stove-piping of resources and assets rather than the building up of partnerships and relationships. On a military installation, because of the command structure, the potential for the complex systems of medical, tactical and garrison assets to confront, rather than coalesce requires trained individuals to facilitate the coalition process. Additionally, the military installation of the future, will not only house Army assets in different command and control lanes, it will also have an increasing joint basing population with combined missions, more civilian personnel involved in that mission and a greater need for partnering with the local surrounding communities to provide services. We would also need to assess the health disparities of the communities from which we recruit. The health risk factors from the recruited population will create a military population who, when combined with the unique stressors of a military lifestyle, may result in a detrimental impact on the health of the individual as well as the health of the community. The diversity of different sociological, mission, and cultural impacts have the potential to benefit the system as a whole, or create additional tectonic lines. One may argue with increasing diversity, there will also be increasing diverse tools, resources and experts in which to draw programs, ideas and services. However, if the diversity is not facilitated in such a forum that enhances characteristics and strengths, then the potential for a muddy, pot without structure, reason or purpose threatens.

Our Key Stakeholders:

Coalitions transcend the political machinations of agencies that are for themselves first and the organization later. This puts the stakeholder of commanders, soldiers, civilians and families first. As health risk factors become more complex, as technology evolves and communication overload becomes the norm, we again, need to ensure that we all come to the same table to share experience, resources and opportunities. Coalitions allow personal agendas to be left outside the door and provide an environment in which the needs and risks of the populations we serve are put first. When the coalition as a whole puts forth a strategic plan for health for the community together, then each individual mission is working in a concerted effort rather than through individual agendas. This is an opportunity and process to reduce the existing disparities. Stove-pipes only serve to compound disparities and provide environments for them to thrive.
As military communities of the future develop, commanders will increasingly be required to understand and integrate the technology that interprets the health and well being of Soldiers and Family Members. Commanders will not just be leaders of people into war, they will become responsible for the mind, body, spirit ramifications of war plans. Commanders and NCOs will no longer need just tactical training, but also education in leveraging the best out of each of their individuals to perform at an optimal level of potential. Rather than leaders trained in strategic warfare, we may move to leaders trained in human performance optimization.

The "Army" as we know it with separate branches may become a consolidated organization of simply "the military" with various MOS' in order to consolidate resources and provide for a means of cost containment. Ultimately, the reorganization of the Army will place the senior commander

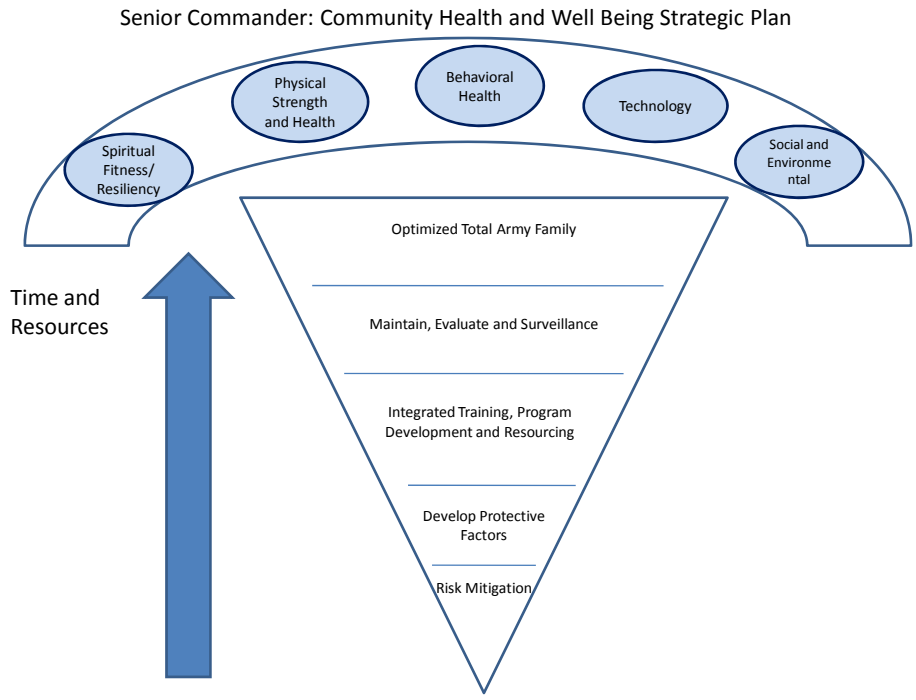
for the installation in charge of all assets and require him/her to have additional working knowledge of the health capabilities and health risks of the individuals in his/her command.

As the military becomes increasingly purple, this raises the issue of who is in charge of the Soldiers' health and well being? Will this commander be responsible to checking on the health profile of the Soldier and/or family member to assess their capabilities and potential risks to the mission? One may argue that the Senior Commander then becomes the responsible party for the health of all Soldiers and Family Members. As a result, this commander has a huge stake in the execution of his/her mission based on the health and well being of Soldiers and Family Members.

By 2039, the coalition will become advocates for increasing levels of health and well being and will ensure that resourcing is correctly allocated to meet the needs of the installation individuals. If the resourcing structure moves from a headquarters level to a local level, and is need based rather than numbers based, appropriate utilization and resource allocation will be ensured. This will also move the structure from risk factor and problem behavior reaction towards higher levels of well being and performance.

Ultimately, the figures above will mature into a structure that resembles the following:

Figure 3:



As commanders are inundated on every level about information about the health and wellness of their population, they will need a group of subject matter experts to plan and react to health threats. The council/coalition will be a built infrastructure to the organization that will be the basis for dealing in an integrated matter with whatever issues lie at the heart of the commander's strategic plan for health. Depending on the degree to which health services continue to be offered past retirement, the creation of preventive cultures and communities that thrive on health rather than illness have the potential to reduce the health burden of the military medical system. Without

coalitions for the health, the result will be continuations of the current C2 culture that stovepipes resources and results in cubbyhole systems, rather than systems that interact harmoniously. The key to community coalitions or councils is that they have the ability to address local health concerns and mobilize local resources in a consolidated effort and the make recommendations to higher level headquarters of the impact of their visioning and intervention process. Coalitions transcend the traditional military structure and provide all assets to have a stake in the Senior Commander's plan for the health of the troops. Ultimately, this will translate to improved utilization of resources, a healthier Army population and a structure that can withstand the fluctuations and changes of time and still react to the needs of our Total Army.

Recommendations:

1. Resource and support Health Promotion Officers at every Army installation in support of AR 600-63 as the master facilitator to the senior commander

2. Resource and support a standardized Health Risk Appraisal for every member of TRICARE services which will allow aggregate health information on each community level and identify community needs as well as Army wide health needs.

3. Resource and support ID Cards that carry individual health information that can be transferred as beneficiaries PCS to new installations. Create a data base of key health information points that allow for aggregate data queries on installations.

4. Require each Senior Commander to utilize the Health Promotion Council to create a Health and Well Being Strategic Plan that includes mind, body, spiritual, and performance aspects of the Total Army Family.

5. Identify key characteristics of the HP Officer and create training that develops these characteristics of integrator, facilitator, consultant, advisor and relationship builder.

6. Develop resource allocation structure based on health and wellness needs rather than population/ASIP figures.

7. Develop DA level Health Promotion Council that allows information from grassroots to be filtered to HHQ as well as best practices to be filtered down through HHQ directives.

8. Utilize the council/coalition as an infrastructure to deal with the holistic health/wellness of the installation rather than problem solving specific issues and then dissolving.

9. Realign all health and wellness assets under one umbrella rather than conflicting command and control lanes.

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Using the Community as a Buffer for Poverty and Improving Lifestyle – Kathleen Haskell

Community lifestyle and poverty levels will see vast improvements over the next thirty years. Psychological understanding of positive psychology methodologies integrated with early childhood education on nutrition, resiliency, active lifestyle, group well-being, group bonding, and self-efficacy has led a vast majority of the populace to work together for the common good of community health and well-being as well as reduction of poverty levels. How were the necessary steps identified and positive changes implemented? What measures were put in place to avoid "group think" mentalities harmful for continual improvement?

Future of Healthy Communities

Enhanced Access and Lowered Costs Lead to Healthier Communities

In the year 2039 strategic placement of interactive health avatar units have lowered health care costs by providing preventive and diagnostic care to the community. The avatars are placed in locations such as schools, hospital Emergency Departments, grocery/drug stores, community health and activity centers, libraries, retails stores and even in the homes of private citizens who are able to afford a private in-home system. The benefits of strategic avatar placement has resulted in an overall improved level of community health and assisted in early disease diagnosis, detection of catastrophic disease, and disease propensity. At the same time an emphasis on wellness, prevention, health education, quality patient care, and safety were consistently communicated.

Cultural Inclusivity Increases Sense of Community

The avatar units will be culturally competent and verbally interactive. They will ask initial questions from the individual. From the interaction a perception from the conversation is calculated by the avatar as to which method of communication is appropriate, i.e., language, culturally and linguistically appropriate, communication style based on educational status, etc. For returning avatar users (any avatar, anywhere) utilization of electronically positioned identification sources immediately recognize an individual previously stored in the databanks, pulling health history and appropriate communication style. Avatars will be able to coordinate preventive health appointments, provide the most recent educational information on wellness, medical advances, childhood development, preventive vaccinations, as well as monitor and continue to educate on physical activity, risk behavior modification, and nutrition.

Poverty No Longer Barrier to Receiving Health Care

Uninsured individuals of the early 21st century typically having no regular contact with a physician, and utilizing the emergency rooms as their sole access to health care, greatly benefit from the increased availability of avatars. Avatar units will be co-located with medical center emergency rooms but will divert individuals with lesser illnesses away from the emergency rooms of our medical centers allowing for practice of true trauma/emergency treatment and improving timeliness due to decongestion of the emergency room. These units will be active 24/7 and implement a huge wellness outreach to otherwise disenfranchised individuals without health care insurance or access to regular health care. As a result, poverty will no longer be an obstacle for obtaining quality health information, guidance and education.

Avatar units will be able to provide valuable medical information from a huge resource database to coincide with the individual's current condition analysis to a physician on call, if necessary. The physician may be located anywhere in the U.S. The avatar will be equipped with two-way communication devises. If the avatar determines the patient suffers from a low-concern common illness, the avatar will give instructions on how best to treat the condition and a follow-up appointment made with the avatar. If the condition requires immediate action, the physician on call may address the situation or the avatar may choose to call an ambulance or direct the individual to the nearest emergency treatment center for further care.

Due to the easy access to health treatment and quality preventive health care education, the physical and emotional barometer will be raised for the community. No longer will individuals worry about health care costs or access for their families, or be confused by lack of access to educational information related to health care. Questions will be easily answered at a brief visit with the closest avatar unit.

Early Education and Societal Intervention Reduce Poverty/Increase Potential

A consideration identified by Martin Seligman, founder of positive psychology, asks whether "the understanding and alleviating of suffering trump the understanding and building of happiness?". The field of positive health has direct parallels to the field of positive psychology, parallels suggesting that a focus on health rather than illness will be cost saving and life saving.

In the early 21st century poverty was seen as a shortage of health care, a lack of "livable" communities, and inferior educational opportunities (whether due to insufficiency of facilities, lack of access or an inability to learn). Steps taken through educational community outreach coalitions helped enhance early childhood response and involvement, positive peer pressure, competence skills, assertiveness, morale, and willingness to collaborate. These early outreach efforts paid huge dividends by affecting lifestyle changes, perception, and group cohesion. As this newly enlightened generation matured so did their desire to improve their communities through collaboration and innovation, thus reducing the levels and perceptions of poverty, along with the inherent bias that follows those less fortunate.

Positive psychology, like the positive philosophical tradition, emphasizes human resilience and flourishing. Positive behavior built on the positive psychology framework focuses on identifying

and developing human strengths rather than altering weaknesses. The most effectual implementation of this educational strategy is utilized in early childhood development where young minds are eager to assimilate new information, enjoy diverse experiences, and create new bonds with their peers.

Peer Pressure and Positive Psychology

Ask any parent or teacher to name the strongest influence on children today and the most frequent response will be "the peer group," an observation supported equally by popular culture and by scientific research. Positive Peer Solutions was an intervention strategy that helped students bond to school through "making a contribution to the whole". An alternative intervention strategy called Positive Peer Groups operated for the last decade of the 20th century in grades 5-9 in both public and parochial school settings throughout northeastern Ohio. The model was designed and implemented by the Prevention Initiatives Division of PSI (Prevention: Systems Intervention) Affiliates, Inc., a private consortium of psychologists, educators and prevention specialists who worked in partnership with the director of government programs.

What was so effective about this program was the research-based, multi-tiered program of teacher, parent and staff training; consultation; and most importantly, direct services to students resulting in an improved student interaction with authority figures and greater demonstration of student initiatives. The program was awarded Ohio's BEST Practices Award, which honors innovation programs demonstrating significance, effectiveness, originality, transferability and responsiveness to the varied educational needs of a diverse population. Based on program results, students tended to be more focused on tasks, more sociable, more outgoing, and less negative. This resulted in a kinder, happier child that felt part of a team.

According to authors of Group Well-Being: Morale from a Positive Psychology Perspective, positive psychology has considerable value as an umbrella term and overarching perspective that allows previously separate lines of work to be seen as interrelated. Emphasized topics in the article included character, giftedness, life satisfaction and optimism with the added topic: morale, a marker of well-being that was previously infrequently addressed. As used in their analysis, morale is a cognitive, emotional, and motivational stance toward the goals and tasks of a group; subsumes confidence, optimism, enthusiasm, and loyalty as well as a sense of common purpose.

Groundwork for Community Cooperation and Proactive Lifestyle Improvement

So where did the work begin in planting the seeds of change for a more positive and healthy community lifestyle in the future - in addition to having a constructive impact on poverty? Awareness and education on positive psychology methodology integrated with early childhood education on nutrition, resiliency, active lifestyle, group well-being, group bonding, and self-efficacy was the main base for community cohesion and improvement.

As with any viable educational outreach, observations during early education implementation on positive health, positive psychology, positive peer pressure, group well being, morale, and personal responsibility provided lessons learned to constantly improve and enhance the educational

opportunities. The trap of "group think" must be avoided at all costs by continually seeking out pioneering, dedicated, and diverse individuals for inclusion in the analysis and modification of processes and content to ensure fluid, continually improving educational methodologies.

The initial outreach for early childhood education began within the military system through child and youth services, in-home post childcare and medical health and wellness clinics. The first interactive DVDs provided to the groups utilized avatar-looking childhood peers to guide children in positive psychology, resiliency, active lifestyles, group bonding, morale and self-efficacy. These DVDs had a colorfully distinctive game-like quality, which encouraged attention while providing value-based, group self-esteem lessons. Similar to previously introduced Soldier and Civilian educational tools, these DVD peer avatar "leaders" allowed for a group choice on topics being addressed, which were followed by visual repercussions or "thumbs up" reinforcement for the most appropriate response.

A side note for utilizing the military system early childhood educational outreach would be the documented successes with childhood happiness and well-being as well as their desire to commit, collaborate, innovate, exhibit high morale, achieve higher educational scores, etc: Recruitment opportunity.

Understanding the value of a common purpose in the day care center, the classroom, the community, the city and so forth, it appears imperative that steps be taken as soon as possible in order to educate future generations and provide them with the tools to work together for the betterment of themselves and their communities, as well as lifting up those who live in poverty.

History and Trends

There are many differing concepts of health in the numerous subcultures of America. Beaufort Longest, Jr., a renowned expert in the areas of Health Policy & Management, wrote in 2006 the World Health Organization (WHO) defined health as the "state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity". According to Healthy People in Healthy Communities: A Community Planning Guide Using Healthy People 2010, a healthy community can be described as one that includes resources necessary for its residents to achieve "a high quality of life and productivity". This definition also encompasses access to health care (physical and mental), a focus on disease prevention, safety, and the overall quality of the environment.

Healthy People 2010 is a subcomponent of the U.S. Department of Health and Human Services. This organization utilizes a basic yet effective quality improvement approach referred to as "MAP-IT" (Mobilize, Assess, Plan, Implement, and Track) to organize community resources, develop/implement community improvement goals in quantifiable and measurable terms, and track the progress of each goal. With proven successes and existing programs, the U.S. military - and the medical corps in particular, may play a vital role in improving the health and overall quality of life in communities that lack the resources to provide the services deemed essential to raise their overall standard of living and break the cycle of poverty.

Because of the current political climate, the emphasis for nationalized health care, and need for quality health care delivery at affordable prices, the military is posed (and will likely be mandated) to fill the existing gaps between grossly underfunded public health service agencies and the demand for health care, especially by those who are uninsured and underserved by the existing public health care infrastructure. To avoid redundancies and reduce costs, the military may be required to accept/treat local civilian "non-beneficiary" populations in markets where MTFs/MEDCENs are not operating at 100% capacity. Such a Congressional mandate could come as soon as 2012 but will likely be mandated by 2020 at the latest. Reimbursement rates would likely be at or below 80% of current TRICARE rates.

It does not seem prudent or cost-effective to continue the age-old practice of "compartmentalized" health care based on such factors such as the availability of insurance, age, or Veteran status. Elimination of redundancy and consolidation of sister facilities are the key to success. Such discriminating factors tend to create barriers to health care and a needless (and costly) duplication of health care services. Since 1993, presidential administrations have advocated a reform of health care to control the huge increases and seemingly out of control cost of health care services. To date, these proposals have been ineffective and unfortunately, the U.S. currently has the highest health care costs of any other nation in the world. Over 40 million uninsured citizens tend to rely on Emergency Departments as their only source of health care. It appears drastic changes are needed to address this issue.

The military, with its pre-existing infrastructure and resources, will likely be called on to help bridge the gap between those who need health care services and the lack of health care availability in communities. Military Medicine has been at the forefront of science, medical research and treatment for decades. The brightest minds have created, conducted trials, and utilized much advancement in military treatment facilities. Once again, Military Medicine has the unique opportunity to light the path to a brighter future for those it serves and protects.

Recommendations for the AMEDD

It is apparent that Military Medicine is in the best possible position to provide guidance, leadership and wisdom in reaching goals to improve health care delivery, thus influencing community lifestyle and buffering the effects of poverty. The redundant and costly health care facilities of the past must be consolidated into one lean, talented, accessible and innovative system of health care delivery and education. Military communities already possess many desirable traits that could easily be emulated in external communities through coalitions, councils and other forward thinking groups, creating opportunities for progress and change. The challenge for having an external community influence will be in communicating the positive achievements and encouragement for adoption of similar strategies.

Contemplating early childhood education of the previously discussed positive psychology educational outreach, it would seem prudent to begin research, collaboration, design and production of the described DVD avatar peer "games" for dissemination in military early childhood development groups, child and youth services programs, health and wellness outreaches, etc. Measurement of the effectiveness of such programs would take at least 5 years and the results could be communicated to other educational facilities and modified to meet almost any childhood age

level. However, the sooner the children could be exposed to positive psychology, the better. Many older children already have built-in values, experiences, and perceptions that would be more difficult to influence (not impossible but more intense exposure would be required).

Within two decades, there should be a preponderance of evidence to support this style of early childhood education in improving communities and advancing aptitudes and attitudes for success, thus reducing the chance of familial poverty continuance.

Alternative Forecast for Using the Community as a Buffer for Poverty and Improved Lifestyle

The current climate of polarization, class warfare, government deficits and other human frailties could delay or obscure the ability to visualize positive innovation outcomes, work toward cooperative communities, and reduce the willpower of individuals to invest personal effort and take responsibility for attempting to "make a difference".

The risk of continual government intervention could squash advanced improvements as it absorbs more and more of the country's financial resources. The specter of socialized medicine would definitely dampen resources needed to provide more cost effective, enhanced health care thereby having a detrimental effect on community lifestyles and poverty levels.

Additional warfare or terrorist attacks would strain the assets of Military Medicine, making research and analysis more difficult in reaching toward the 2039 vision.

There is a distinct possibility that the affordability of health care will not be within reach of many Americans. Avatars may be able to communicate directly with patients but many Americans may not have the capability, desire, or motivation to use an avatar to change their lifestyle or be advised of potentially fatal conditions due to factors such as mistrust of the technology security, fear of what the avatar may advise, lack of access or distrust of the "government".

Local, state, and federal leaders may not be able to reach an agreement on funding, implementation and maintenance of avatar units, or the teacher training requirements and the content of avatar educational outreach tools in publicly funded schools.

The possible risk of solar storms may disrupt power grids, communication capabilities, and economies - setting the implementation programs back by a decade or more and causing damage to emerging infrastructure construction.

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Achieving Healthy Communities Up to and Through 2039 - LTC Beverly Ann Beavers

Current Situation Spring 2009:

The state of our nation's health is drastically declining. The United States along with many other countries face a burden of chronic disease. Presently, 7 of the 10 leading causes of death in the United States are chronic diseases and almost 50% of Americans live with at least one chronic illness. The people who suffer from chronic diseases such as heart disease, stroke, diabetes, cancer, obesity, and arthritis have a reduced quality of life that also affect the quality of life for their family members and those that they work with and friends they turn to for assistance. Preventable health risk factors such as lack of physical activity, poor diet and tobacco and excessive alcohol use contribute to the development of the chronic diseases.[i] The United States is at the tipping point. Now is the time to make change. With the introduction of a new President of the United States, Barrack Obama, whose platform is based largely on change, the United States Government must seize the opportunity to push for programs that will build healthy communities for our entire nation and be the model for the rest of the world.

The cry for strong action at the community level did not just surface with the infancy of President Obama's election to office. And as we move into the years 2019 and 2029 he will be recognized by all nations as the catalyst that stood point for our nation with such a delicate matter, the pure existence of a healthy life. President Obama and all leaders of our Congress and Senate will work together over the next 8 years to truly lay down partisan battles in the quest for achieving healthy communities. The results will not be realized in the matter of one or two administrations. There will be pandemic catastrophes along the way that will challenge all of our leaders, their families and our own families. We will experience loss of life on a very large magnitude due to a variety of destructive methods some of which will be projected here. In the end, our nation will face agony and will in many other nation's eyes even suffer huge defeat. But our nation will not lie down and die. We will endure through adversity and build for the battles of our Soldiers even beyond 2039 because of the groundwork that is projected by a nation of leaders that will succeed in achieving healthy communities for today and through 2039.

Defining Generations:

It is very difficult to get parents to listen to their kids in the heat of a battle for a privilege or the approval for more allowance money. It is also hard to get people from various generations to reach an agreement about who has grown up with the most challenges and who has faced the roughest lives. It becomes increasing difficult when you put portions of all four existing generations into the mix and listen to each generation discuss their plights of daily living. Generally speaking most countries recognize the following four generational groups that are active professionally: Traditional Workers (born before 1946): they value loyalty and discipline, and the respect authority and hierarchy. Baby Boomers (1946-1960): their critical years for joining the work force – between the mid 1960s and the end of 1970s – were a period when most European countries enjoyed significant progress. This led to great expectations of success. Generation X (1961-1979): this generation has

the best academic training and international experience in history. They demand a more informal environment and abandon hierarchical authority in favor of a more horizontal and flexible structure. And finally Generation Y (starting from 1980): this generation is the first generation in history to have lived their entire lives with information technology. Like members of Generation X, their childhood was comfortable and prosperous. They are more individualistic than earlier generations and demand autonomy in their opinions and behavior. They emphasize personal activities above social and labor considerations.[ii]

It is imperative to recognize the strengths and weaknesses that are harvestable in each of these generations as our nation moves forward to conquer a quest for healthy communities. As we examine a look into the future for each of the next decades keep in mind how these generations can leverage each other's strengths and how they can, over time, and largely due to adversity learn to accept the concept of working together for a greater good, which ultimately in this scenario means a healthier, longer life.

Defining Success from 2009-2012

The United States is still recovering from what was thought to be a pandemic event with the development of the H1N1 Flu. Over the summer of 2009 there were more than 75,000 deaths worldwide with over 60% of those deaths coming from countries outside the United States. The deaths across the United States do not initially seem to target a specific age group which is uncommon but not impossible. The same cannot be said for the deaths across the rest of the world. The World Health Organization does not have an answer for the world yet as to why. The pandemic episode is truly just a blip on the radar screen and our nation's leaders understand this. The idea that there is some sort of terrorist experimentation being conducted has many governmental and military agencies spinning up their surveillance units. The country has been in a state of frozen fear for weeks. More than half of the 100,000 school districts in our nation were forced to close in the last week of April and beginning of May. As children were forced into their homes and daycares followed suit with the closure of their facilities there were entire communities at home, and have been for months with limited resources and ideas for how to occupy their time and to stay healthy. The closure of schools and daycares has meant the loss of literally hundreds of thousands of jobs for teachers, care providers, janitors, bus drivers, lawn crews, gyms, and hundreds of other areas.

And while all of this may sound critically catastrophic it really is a turning point for our nation. As these tragedies have unfolded across our nation we have not given up. The President has recently released a statement that is endorsed by the senior military leaders and the Surgeons Generals. They have all reached consensus that the United States fatalities were not entirely related to the H1N1 Flu but were largely due to the current state of health for the victims across not just the United States but across the world. More than 80% of the deaths in the United States are primarily attributed to victims that already had one of the 7 leading causes of death in our country, chronic diseases.

In the months following the announcement about the state of our nation's health and how at risk our nation is due to the enormous numbers of Americans with chronic diseases the President's administration has directed a total restructuring of how we as a nation approach our fitness and he wants to establish healthy communities across the United States, with measurable metrics, before the

end of 2016. Since it is the fall and there will be schools reopening in just a few weeks the local mayors and district officials brainstorm what options are available with so little time to plan. It is quickly agreed upon by leaders' at most local levels that there is not enough time to hire bus drivers so all children will walk, ride bikes or use some other non-motorized engine to get to school. The local Boy Scout, Eagle Scout and Girl Scout Chapters, along with all JROTC programs have accepted the challenge to identify all handicapped students that need additional support to get to school and they will be the exceptions in the use of motorized transportation. These Scouts and Cadets will patrol the routes to and from school and will take that burden off of the police force. This traditional approach of walking and biking will be difficult in some rural locations but for more than half the schools in the nation it is a huge first step toward defining a healthy standard for all children. And it is clear to all of the local officials that if their kids can walk to school a large portion of the adult community can walk or bicycle to work. This of course does not work for the millions that live more than 5-7 miles from work but for those in the communities where it is achievable there is already talk by corporate leadership to incentivize those that are able to set the example and walk to work. Some employees are going to shorten those employees work week by one hour a day for a total of more than 20 hours a month without any reduction in wages. What most employees do not realize is that President Obama and the Surgeons Generals have already provided incentives at the corporate level. This will be realized in the coming months but for now the incentives are a big motivator for thousands of families that have lost so much and lived under so much fear for their health in the last few months.

The nation is working too hard. The nation is stressed. The nation is at a point where we have to slow down and rehabilitate. The drive has to come from the senior leaders. The reduction in corporate business process hours will, in the matter of months and years, lead to a renewal of devotion to health and wholeness. The nation has already suffered many months of deprivation on many, many levels and it is not difficult to motivate this country to work together for the greater good. While the summer months wore on, the 4-H communities gathered together and trained many adults and children on how to grow crops and to establish gardens. Because the effects of the H1N1 Flu did not really hit till May it was too late to plant a lot of crops for the summer harvest but there are going to be 1000s of gardens to harvest as the fall wears on. The joining of the 4-H and farming communities was a true challenge in some areas because the large farm owners were so angry at the massive losses they had faced with family and then crops and entire farms. The idea of joining together with community organizations of children and young adults did not seem practical. There were differences in opinion initially but the mayors across the states are saying that the success stories are more abundant than the failures. It also is a great start to a relationship between older generations of farmers nurturing a foundation for learning with the next generation of farmers.

In the first few months of the summer the production of alcohol, tobacco and cigarettes was effected when the schools closed and the teachers and other supporting job markets lost their jobs in droves. The government made a decision to stop the production of these items. The government has temporarily halted these productions and they do insist that they will reopen the production plants at a future date. There was a lot of anger by the citizens of our nation when this decision was made. There are caches of these items that have been moved to the many military installations across our country and even overseas but the production sites have not been allowed to return to work. These employees are being subsidized by our government until we can place them in like jobs. The entire nation has had to lean on each other in support of the dismissal of their habits and addictions. There is senior leader discussion with our nations' leaders and the leaders of

other nations to determine when and if they will resume production. There have been deaths and suicides recorded due to the lack of these habits. The greater good may be many months in the future for this objective. There is speculation that some of these items could have a connection to the rash of H1N1 Flu cases but the governmental leaders will not confirm or deny these comments. The local stock of these items were depleted within weeks of the initial announcement and so now the nation has been without these items for several months. Other countries have watched our lead on this action and a few have imposed alcohol restrictions but no one has made the stance that the United States has taken.

As the country goes into the winter of 2009 through the next 24 months there are other monumental tasks that President Obama has asked the nation to look at. He wants to scale down on the plan to continue to develop large hospitals and shift to the idea of scaling down to more accessible ambulatory care facilities. The thoughts are that as we become a nation that is evolving into more healthy communities we will not need as many large hospitals and trauma centers. In the coming years as we gain momentum with healthy communities we will move toward smaller medical practices with a common place military partnership. The military, in communities where it is feasible will place providers outside the military settings and will move them into civilian hospitals. This will provide the opportunity for the military and civilian providers to share their knowledge and to be in a setting where they have smaller workloads and a focus that is on preventive and ambulatory care. In addition, those trauma providers and nurses remaining at the larger hospitals will be able to focus on their specialties because they will not be diverted to work ambulatory and preventive care cases. When the military and private practice facilities are stood up there will also be a widespread push to take students out of their college setting and move them directly into a learning environment where they can have over watch of care with the ambulatory facilities. This will develop into a program that works to establish a program of study with the local colleges. These college students, our future doctors, would be exposed to traditional ambulatory care settings years before they ever receive their doctoral degrees. This additional care provider, that could receive LPN or primary care certifications in a shorter amount of time would be a part of the ambulatory team at a reduced rate because of the training status and in some ways is a cost cutting measure for the patients because the facilities have distributed their care among at least three tiers of employees and additionally all three tiers stands to gain from the cultural knowledge sharing. The primary reason that our leaders are willing to move to this setting with the military involvement is that it is clear to our leaders that our biggest threats to our nation are here within our nation. The idea of providing the medical staff the opportunity to work for the government while at an ambulatory care center will give that provider a chance to work on ways to improve the electronic health record for example. This may seem like a simple thing but if our President's plan to have a universal electronic health record is going to get the attention it needs we have to have our providers across the military and civilian sector working together on business processes and documentation standards. Of course the ramification of this effort to immerse the providers into the community has many other career fields ready to follow suit. In a few months following the decision to allow the providers to work in the community the Surgeons Generals endorse the same decision for all Nurses and a sizeable force of the Medical Service Corps officers to do the same types of mission immersion into the community. There are also moves across the mainstream military to do the same types of actions with active duty military that are working in homeland security missions. It is a great start to getting the military into the community decision making arena. Over the next few years it will provide for multiple opportunities for the military leaders to use this decision as a lead in for promoting a more healthy community for the military family.

Gaining Momentum 2012 – 2019

The year is 2013 and the cost of medical care across our country has taken a down turn for the first time in over 40 years. The average citizen between the ages of 16-42 has less than two visits to the emergency hospital facilities per year. The development of ambulatory facilities run jointly by military and corporate providers/staff is one of the defining success markers of President Obama's first term. There are at least four other NATO countries that are studying our model and making plans to incorporate it as they move into the next five years. The ability to immerse the military into the corporate market place has created a stabilization for military families that equals that of the National Guard and Reserve forces. The flexibility that it gives the military family has opened doors for the military spouse to pursue work and educational opportunities at magnitudes not recognized before.

There is still a very sufficient full time CONUS based tactical force but it also has realigned to smaller bases with a standard mixture of capabilities not defined by Service but by skill set. So it is not uncommon to have a medic from the Army, Navy and Marines working in the same medical clinic on a base. These medics have the same skill sets and training base so their utilization across the clinic is interchangeable. They do return to their service units throughout the year to maintain or get new training as required to keep their service skill sets at their premium.

The average community size has shrunk during the last few years. With the focus on walking and riding bicycles a large portion of our nation made personal decisions to move away from the larger cities and open business in new areas that were not commercialized. The fast pace that the nation was striving to improve upon has subsided. The average school classroom size across the country has dropped to 10 to 12 in all grades. The children are in the classrooms for shorter amounts of time because the government has invested in robust technology upgrades that enable every student in our nation to have laptops with wireless capabilities. Students in elementary school can email their homework to the teacher from home and the teachers can grade it with the use of applications within their use that allow them to return the home work to the student within minutes and if necessary to send the student a video clip of how to work the problem that they missed and get the right answer. This immediate interaction with the student to the teacher has developed an increased motivator to accomplish the work quickly and correctly so that they can move on to the next task.

Emphasis on healthy communities has taken a hold across the United States. The employees for industries across the entire country made it very clear they wanted to be rewarded for their hard work by working fewer hours in the week. Because of the emphasis to increase our technological abilities to telecommute the average citizen works only 20-24 hours a week at the office. That includes most labor intensive jobs as well because the government has provided incentives to the businesses at these levels that build in additional work forces if necessary in order to still deliver services. So the unemployment rates are down across the country at a rate lower than it has been in this century. In addition, the traditional workers that are still motivated to participate in the community have been able to take on some of the lower skilled necessity types of jobs in the community that previously were being filled by a younger, more sedentary workforce. Now that the younger more sedentary workforce is more active and taking on a new role in the community this has even allowed the baby boomers to pick up the slack and stay in the work force a few additional years as well. The governors across the nation have made it an emphasis across their states to reach down into the community and visit with the Generation Xer's and discuss the importance of

volunteering to work closely with the community development planners so that they have a say in how their communities will be designed during the next 20 years. The governors have created programs where the high school students spend at least four hours a month conducting some type of volunteer service. This does not have to be documented in a data base somewhere because the hours are on the calendars of the entire nation. One day a month, projected at least six months out the high school students ages 14 to 18 spend four designated hours accomplishing community work. The work has some sort of healthy twist and it is being met with national enthusiasm. When high school students are visiting a different city or state during the designated volunteer hours they have the ability to set up their availability with a national data base that displays what areas/cities are conducting which events. In the course of just a couple of years the students end up spending several hundred hours working with their peers across their community and even across the nation toward a common theme of improving their communities.

For many years our nation has struggled with the ideas and visions to teach our children additional languages. With the focus on healthier bodies and empowering our whole systems the children of our nation have demanded a national language revolution. Thanks to the technology associated with the government issued laptops the students of our nation are learning a total of at least four languages, including English before they graduate. During elementary school all students are introduced to computer based classes on Spanish and French. By the time the children are in fourth grade they add either German or Korean. During the middle school years the students will take at least one math and one science class completely encapsulated in either Spanish or French setting. During high school at least one more language is introduced and it will come from the Arabic dialects. These language tools are more than just introductions to the language and the written text. They are also introductions into the cultures of the countries and are gateways into the business settings of the respective countries.

The decision to reign back on the production of alcohol, tobacco and cigarettes was a very strategic move by our government leaders. It destroyed some mighty empires within our nation but after reopening the production plants 24 months later the average family has only slowly started to reintroduce the items back into their social settings. The large alcohol events seen at sporting events or in sports bars are now replaced with healthy drinks and energy variations that provide healthy alternatives at a cheaper price. The overall consumption rates of these items are at all time lows and with the continued marketing strategy that our health care communities are promoting the numbers of children that will start using these products is going to almost become nonexistent. This has a great impact on so many of the chronic diseases that were affecting the country in 2009. The numbers of diabetes cases has dropped by over a 1/3 nationwide. The number of new chronic heart disease cases is declining each year. The number of strokes recorded in our country has been cut by 15 percent in a matter of only five years. There are significant improvements in the overall health of the traditional workers and baby boomers. It was estimated that most of this population would not live to see their 70s or even their 80s because of their chronic diseases now a huge majority of them are right there and are still contributing to their communities and setting the example for the Generation X and Yer's.

The other significant impact that the alcohol limitations has provided to our healthy communities is that the number of child abuse and spouse abuse cases that during the early 2000's flooded our emergency rooms is a scene from the past. The number of molestations, rapes and murders is down in every state in the nation and the common respect for your neighbor is practiced not just read

about. The revivals of religion have been a strong foundation in the success of health communities. The emphasis on denominations does provide some divisions in some communities but the common theme across the nation is that Sunday is a day of providing thanks and for retooling one's soul for the next week. This emphasis on attendance is not driven by any strategic communication pamphlet is rejuvenated by the traditional workers. Their memories of how they had survived the lean years during the Korean War and Vietnam era have enabled them to share their abilities to find inner survival strength through their relationship with their God.

Continual Growth and Success 2020-2029

The continued progress of healthy communities across the United States is monumental. The fitness levels of the civilian population are just trailing that of the active military force. The average middle school age student spends at least 90 minutes a day performing some type of personal fitness activity. The average adult between the ages of 18-40 is participating in one personal fitness activity and one group/intramural team activity at least five days a week. The Body Mass Index for the average adult male has decline by more than 7 percent and for the average adult female has declined by more than 12 percent. The Plus sizes clothing industries are struggling and will be forced to close their operations within the next two years.

The corporate business leaders are seeing the lowest loss work days due to illness rates in more than 20 years. The results are so incredible that businesses are not able to give the average employee three weeks of annual leave instead of the forever customary two. There are also internal incentive plans that are marketed across the nation. Some businesses actually have installed internal gyms at their offices. The treadmills and elliptical machines are operated on a points system. For every 10 minutes of exercise that is captured on the employees' identification card during lunch breaks a monetary bonus of 50 dollars is added to the employees' paycheck the next pay period. This has been an incredible motivator to head to the gym for at least a portion of the lunch period and has decreased the temptation to have so many potluck gatherings in the snack room. Now it is customary to see your best friend at the office gym instead. For the military population if a Soldier maintains a 290 or above on the Army Physical Fitness Test for at least two years then they receive a 1000 dollar bonus each year that the 290 is sustained. That 1000 dollar bonus can be exchanged for additional leave if desired. If the Soldier has family members that wish to participate in the administering of the APFT then the family member will receive 500 dollars each and every time they arrive to take the APFT with the Soldier and if their score increases during the next test there will be established bonuses as well.

One of the most significant aspects of the overall improved health for the healthy communities and the associated military force is that in all practicalities any adult from the age of 18 to 50 is probably capable of defending a piece of our nations freedom. That defensive posture does not have to come from learning to wear the uniform but it has been institutionalized in our academic curriculum that the military, while now serving within the daily businesses of our communities is still the most trained and ready force of all militaries across the world. The number of wars and conflicts that our nation has faced since the drawdown of 2011 and 2012 from Iraq and Afghanistan has been minimal. There have been an occasional power struggle with nation's leaders but these did not involve large military muscle movements. They were smaller scale quick insertions that lasted for less than six months at a time with few or no casualties. The most incredible development with

these quick insertions is that the military service member entered these conflicts in many cases standing beside a governmental employee, or contractor that was just as physically fit as the service member. The improvements on the technical and tactical weapons used to fight our enemies are so advanced that all of our adversaries are quickly brought to surrender. The fighting forces of military and partnering governmental and contractor supporters are simply impressive. At not any other time in our nation's history has every citizen taking on the task of defending our freedoms been so physically healthy. Within a mere 20 years victory has been achieved for the nation in reducing chronic diseases and establishing healthy communities.

Destruction but not Defeat 2030-2039

All of the years of developing physical stamina and preparing the healthy communities are tested when a meteor falls from the atmosphere and lands in portions of California, Arizona, Utah and New Mexico. During the last ten years the United States has spent a significant amount of research dollars to study the effects of weather harvesting across the United States. During the winter of 2032 it was determined that some of the research involving the meteors and stars had created some atmospheric disturbances that could not be contained. The President of the United States was forced to make a plea to residents of all states west of Texas and south of Oregon to begin vacating the area. The residents had a mere 8 hours notice to leave their homes. The results are devastating. The United States suffers a loss of life rate that approaches close to half a million people. The leaders of other countries quickly turn to the aide of the United States. It takes months to work through the destroyed lands and to document the findings. This natural disaster has destroyed key military nodes of operation. There are massive losses to the agricultural industry. Key leaders in our nation's administration are gone. The environmental concerns are evaluated and documented. The nation once again has to take a stand and recover from adversity.

It is now 2039. During the year 2009 the United States was faced with a challenge that was killing the population. That challenge was one of chronic disease. When faced with an additional challenge, the HINI Flu our nation's leaders and citizens choice to prevail. In a matter of less than 20 years the nation had realized great success. In 2032 the nation once again was challenged. The meteor tragedy of 2032 left a battle wound on our nation that could not be repaired with the wave of a wand. But with the improved health and strong mind of our technically savvy population the country has returned to a state of normalcy in less than seven years. The traditional workers from previous generations are no longer with us and the baby boomers are still providing input to the restructure and redesign of the road networks in California and the other effected states from the Meteor event. The baby boomers have adapted to the use of technology during the last ten years largely because so much of the technology is voice operated and as the Generation X and Yer's always say the baby boomers have always liked to talk. The new roadway design will be tailored for the hybrid vehicle that is electric and solar powered. When the vehicle is fully charged it actually is able to carry up to 1000 pounds of cargo at a height of 25 feet and literally flies above the cars on the road. The Generation X and Yer's have been joined by Generation Z. Generation Z is the first of many generations that has always had an electronic medical record since the date of birth. This generation routinely begins the education process at the age of 4 and is ready to begin college by the age of 16. The organization skills of this generation is phenomenal and their memory capabilities are four times that of previous generations because they have learned to file/arrange their day in the same fashion that our technology files and stores information in computers.

There are more than 10,000 citizens that suffered some sort of traumatic amputation or burn during the Meteor Tragedy. Our hospital system was ready to handle the event. In less than three years over 50% of those amputees had returned to full physical capability. Even those with hearing loss and blindness have received their bionic device that now enables them to see and hear like they did before the event. The use of bionics in such a large portion of our population has improved our defensive posture. Those fitted with bionic devices, when willing, are given a new trade that involves the skill of working as surveillance or reconnaissance individuals with very specialized military teams. These persons are given special bonuses to work within our most elite military forces and they have access to the newest technologies available. The success of the bionics program has been so tremendous that it is anticipated that the dollars used to expand research in the area will increase by more than 50% in the next year.

There were many children that lost their entire families during the Meteor Tragedy. These children were cared for and homes were provided to all of them there are no orphanages or homeless in our nation. The health of our communities has driven the pride and desire to prevail up to levels that could have never been anticipated. In addition to there not being a need for homeless centers there is no longer a need to have assisted care facilities. As the traditional workers and baby boomers started working more closely with the Generation X and Yer's during the last 20 years there was an establishment of a common ground where the younger generations actually revered the opportunity to take in the older generations and gain wisdom from them each and every day. The same has carried over after the Meteor Tragedy. The citizens of our nation have relished in the value of wisdom to be gained from teaming with those older and younger than ourselves. The skill sets and life experiences that have been harnessed by individuals are unique and priceless and now through our nation's trials and triumphs we have found another peak of success.

Once the chemists and biologists were able to start conducting research on the meteor elements they were able to isolate the last gaps in creating a cure for three types of cancer; skin, ovarian and lung cancer. They are able to continue to explore the idea of weather harvesting and by the year 2039 are able to direct rain showers to seven states that are below average for annual rainfall norms. The chemists and biologists are of course using their hand held laptops to perform all of their research with their mobile labs. Their hand held laptops allows them to complete over 400 experiments on the meteor within six months of the tragedy. One of the greatest discoveries with the meteor is that alternative heating and fuel capability that it holds is estimated to house more than 125 years of use for our nation. The President has just put together a team to build a strategy for the effective use of the meteors remains. The health of our nation's citizens is strong. The resiliency of our nation is primarily due to the overall health of each citizen. If the meteor had hit the United States 20 years ago we may not have been strong enough to survive the devastation. We do not have to dwell on that though. We can look forward. There is talk that the President also wants to put together a team of individuals to begin the nation's strategy for approaching the next 30 years.

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Healthy Communities 2039: An Army Living Green - LTC Dana K. Renta

Living Army Green: The Current Situation

Despite improvements in medical advancements, cures in many diseases and a national awareness of improving one's healthy lifestyles can improve health and lengthen lifespan, the incidents of preventable diseases continue to climb in 2039. Obesity is at epidemic proportions such that industry has retooled their factories to make anthropometric design adjustments to fit America's girth. Lung cancers, sexually transmitted diseases like HIV, and other modifiable diseases like diabetes, cardiovascular diseases, asthma, low-birth weight infants, and mental illness remain at enormous levels, impacting not only our nation's economy but also our national security. National apathy in communities continues to grow and America fails to adopt healthy lifestyles. Americans die in their early age from chronic preventable diseases, dropping far below other nations[iii]. The cure for cancer was developed more than 5 years ago, but because healthy lifestyles were not enforced or nationally adopted, cancer rates are increasing. The impact of this is felt by the US military. DOD's ability to attract and retain healthy recruits is dismal at best. In general, less than 5% of the US population in 2039 meets entrance criteria for the military. Those who meet entrance requirements choose other work and find no value in being a member of the military. So DOD is forced to take recruits who are sub-optimally fit and work them into shape. Recruitment cost quadruple because of the investment in new recruits. DOD campaigns hard to promote healthy lifestyles in recruitment and retention of its personnel; it is a long-term investment in national security and the Army cannot fail. Service contract commitments for new recruits are a minimum of ten years. The Army promises new recruits (for themselves and their families) the newest healthcare technology in disease prevention, epigenetic therapies[iv], and healthy lifestyles in order to lure them into long-term service. Over the past decades, the United States has grown to be a nation of internet and cyber geeks. We have become physically inactive individuals preferring to exercise our brain cells rather than wasting energy exercising our bodies. Really, we have very little interest in communicating with others without the help of electrons and are interested in very little save ourselves and our immediate needs. Thus, in order to improve overall national health and recruitment in the Army/DOD, our ability to recruit using healthcare as a major modifier will help retain these individuals beyond their ten-year commitments. Furthermore, it will give us time to penetrate the limits of their social ineptness and develop them as leaders of cultural interactivity even on the internet.

The Army is far smaller than previous generations. This shrinking Army is hard-lined to the internet, cyberspace, and space. Currently, the Army has mastered quick data analysis of global financial and political events and leads the world in mapping global trends. Thus, the US Army prevents major initiation of conflicts. Soldiers are rewarded for their sedentary traits, especially those who master cyber surveillance and intervention. In fact, now days, most wars are conducted over the internet. Nations fight for e-bytes and space grids. The Army is capable of launching attacks from space platforms. As in the past, wars revolve around those who skillfully control the greatest amount of limited resources. Highly valued resources in 2039 include water, clean air, and anything that produces limitless sustainable and renewable energies. America needs energy to sustain our insatiable habits and manipulate other nations to behave in our best interests.

After years of studying the impact of climate changes on disease and the environment, some based on Al Gore's environmental warning in *The Inconvenient Truth (2006),*[v] the US established national policies to promote carbon neutral energies to stabilize and thwart the growth of GHG emissions and its global impact on climate change and disease.[vi] In order to support this national policy, the US Army was tasked to implement a conservation plan which maximizes recycling of its national resources (such as land, water, and minerals) and "recycling" its Soldiers by promoting healthy lifestyles for a renewable, more resilient, and sustainable Army.

In order to reverse this dooms day trend, Army leadership has taken an aggressive stance to improve healthy lifestyles and disease prevention by designing healthy communities. The Army will focus on designing communities which value environmental greenness, playing an active role in exploiting eco-friendly living and alternative clean fuels. By promoting environmental greenness, the Army will encourage the development of a force capable of recycling quickly through missions, maximizing its forces genetic (inherent) resources and influencing their resiliency via environmental wellness. MEDCOM will be able to reduce Soldiers' inflammatory responses to stress and disease. Combining different modalities of treatments to include epigenetic therapies, optimization of one's genetic expression by maximizing healthy lifestyles and environmental exposures, and iPS[vii] (pluripotent stem cell phenotype) interventions, MEDCOM providers are able to delay or minimize Soldiers' responses to stress on the battlefield and improve the overall health of the armed forces. These therapies will also be available to other beneficiaries to reduce chronic diseases such as sickle cell disease, diabetes, cardiovascular disease, rheumatoid arthritis, dyspepsia, Alzheimer's disease, chronic depression, anxiety and PTSD.[viii]

Living Army Green: Designing Greenspaces on Installations and Recycling Waste

By 2039, recycling has reached an amazing effort on Army installations such that on every subdivision there are recycling collection stations. Commonly, everyone who lives on Army installations values recycling and preservation of the environment. In order to live on post, one must agree to recycle and comply with recycling of all waste. Installation recycles sewage and water separately. Drive through recycling collection stations, resembling quick-lube facilities, accept common elements such as glass, all plastics, rubber, metals, construction materials, batteries, oils, and all food and lawn debris. In return for dropping off recycling materials, participants receive moderate credit toward their maintenance bills (electric/water/sewage) and recognition by the Garrison commander for promotion points. Other benefits for those participants who qualify would include receiving compost and organic fertilizers for their allotment gardens, which increases their yield per foot food production to maximum capacity.

Garrison Recycling Centers recycle all post waste and generate operational funds for garrison, MWR, post scholarships and ACS. This promotes fiscal responsibilities of garrison citizens and makes it an honor for them to live on post. Off post living is extremely expensive and hazardous in 2039. People who live off post do not feel any neighborhood responsibility and are often times seen bringing their debris and recycling to post in order to participate in post community activities. This reduces splintering amongst military personnel and makes vying for post housing extremely competitive.

Living Army Green: Designing Green Activities and a Healthy Population

To reduce the sedentary lives of its Soldiers, Garrison builds state-of-the-art recreational facilities and free outdoor activities to promote healthy active living and reduce stress. At a minimum, activities include: extensive and challenging cycling and running paths, lit by solar-powered streetlights and built up (mounded) from recycled debris; downhill ski and cross-country courses made from recycled waste; geothermal induction heated walk-paths[ix] that never requires snow shoveling (and reduces falls/morbidity) and promotes walking even during inclement weather; solar based solar power (SBSP)[x] (above the ground) monorail transport system; luscious green golf courses, soccer , football, and baseball fields maintained by underground watering systems, designed from drought resistant grasses which require minimal fertilizer and thus limit runoff into streams and lakes;[xi] fishing areas to promote family togetherness and sales of farm-raised fish to Army beneficiaries again to benefit Garrison's budget; tennis and other racket activities for all ages; man-made mountain climbing facilities in deserts or flat-lands made from recycling waste; skateboard parks made from recycled materials; wind or kite sailing for those with biological needs for adventure. This lifestyle helps recruit individuals into service and maintains others within the service, making the exercise gap between civilian and military communities grow very large. Participants scan their CAC cards to receive credit points for using exercise facilities and receive bonus points for pay-for-use activities or electronic indoor aerobic games or movies. This all helps to reduce family stress while promoting aerobic activities and reduces usage rates for medical treatment at the MTF.

To promote active lifestyles, military beneficiaries are encouraged to participate in green co-op gardening. Using recycled compost, participants grow their own vegetables and fruits to encourage healthy eating habits, reduce stress, and promote environmental respect among their children. Working in allotment gardens[xii] teaches kids skills about water and land management, food costs, respect of farmers and immigrant workers. These organically grown vegetables and fruits help offset moderate commissary prices and encourage nutritious benefits, ultimately teaching beneficiaries how to be self-sustainable and providing options to families to stretch their hard-earned dollars. Excess garden produce is sold to the local community with generated funds to benefit garrison community activities.

Educational programs to promote healthy food preparation and choices help to improve overall installation health. These classes emphasize anti-inflammatory foods or polyphenols, oxidative radical busters, to reduce morbidity and promote healthy lifestyle choices which ultimately reduce the Soldier's exposure to potential hazards, thus reducing risk of cancer and other chronic diseases.[xiii] Behavioral modification classes educate beneficiaries on stress reduction, understanding and coping with change, and becoming adaptable and flexible. Epigenetic therapies will focus on reducing chronic diseases and the prevention or avoidance of diseases by recognizing and mitigating hazardous exposures in their environments. [xiv] Infectious diseases will remain a challenge both because of climate changes (an increased risk of exposure to disease-carrying vectors) and extensive global travel (an increased risk of exposure to non-indigenous, less familiar infections.[xv] Furthermore, infectious diseases will be difficult to tackle because of overcoming new inductees differences in cultural norms conflicting with Army norms.

Ultimately, DOD is recycling its people, its greatest resource. We are focused on improving the sad lot recruited and improving their lifestyles by influencing their choices and behaviors. Recycling people allows the Army to reenergize and revitalize the military. Reducing stress and the expression of biosensitive disease markers is optimized in healthy environments and healthy lifestyle choices. The Army knows in order to improve and retain its forces, it must improve the quality of personnel within the force and the health of their families. A healthy force reduces behavioral health "madness, " expression of cancers, and ultimately reduces long-term healthcare costs and proves previous theories that living environments can affect health outcomes. [xvi] The ROI is staggering as people are retained longer in the Army and performance is lost only after age 67. As science progresses in 2045, recycling of people via growth of stem cells may become a more viable option only if the people of the United States resolve the ethical dilemma associated with stem cell medical treatments.

Living Army Green: Designing Green Alternate Fuels

In order to reduce overall greenhouse gas (GHG) emissions, the Army has engaged in alternate fuel sources to keep us on the move in garrison in Theater. The landscape on Army installations will appear different as rectennas, [xvii]rectifying antennas that convert microwave energy into direct current, will pop up throughout post. Solar based solar power (SBSP) generation, produced in space and collected on unmanned satellite stations, collects solar thermal microwaves and beams them back to garrison storage stations.[xviii] Garrison converts these microwaves into usable electrical energy which may be used for Army vehicles, facilities or housing. Buildings and facilities are built to conserve as much energy as possible, designed for all seasons. Ultimately, off the grid, Army posts are self-sustainable. Solar thermal microwave generated energy works 24 hours daily and is highly reliable as it is collected in space without impact on ground weather. To further reduce garrison energy consumption, heating and cooling occur via a geothermal drills, only 3km into the earth's crust, instead of 10-30km as previously used in 2006.[xix] This limits fracturing of the earth's crust, making it a cost effective use of this available and endless supply of heating. In snow-covered environments, geothermal heating is used to heat sidewalks and important areas on post. In 2039, scientist also have developed other alternates to conventional nuclear energy sources, using however lighter (not heavy metals) with sharply decreased half-lives, thus removing any previous debates on intergenerational justice[xx] previously seen with enriched uranium production. In short, there is an endless supply of clean energy, all of which is affordable and reliable for not only commercial and home use but also military use.

For POV and some Amy vehicles, two other types of fuels have been developed: one derived from water (NREL)[xxi] and the other derived from alga.[xxii] Imagine filling up your POV at water pump stations to use in your water fusion engines; these engines are carbon-neutral, running clean and fast. Army vehicles use this type of engine because of the cost prohibition of fossil fuels. For engines requiring much greater horsepower, like aircraft and trains, algae derived oils allow the Army to produce cheap but high quality fuels. Byproducts of alga-produced oil is used in the allotment gardens as compost or sold to local farmers for animal feed. By maximizing photosynthetic process (chloroplast technology)[xxiii], carbon emissions are reduced and America severely reduces its dependency on Venezuela, Iran, and the Caspian Sea.

Living Army Green: Looking To the Future for Sustaining Green

In order for Army posts to sustain a green organic environment and maximizing the earth's renewable sources, the Army is busy working with other activities like DOD, NASA, and NOAA to investigate bridging weather control centers. Army Weather Brigades accurately forecast weather reports to local communities, predicting 5 days in advance of severe weather. In 2039, although weather steering of hurricanes and severe thunderstorms is possible,[xxiv] successful control is debatable and ethically questionable. Regardless, Department of Homeland Security remains interested in using this technology as a last resort for national defense, despite the UN agreement against any military control of weather now over 60 years.[xxv] Stabilizing GHG emissions has given the world a needed break in climate change and has resulted in more moderate weather of less floods, droughts, hurricanes and tornadoes. Reducing local air pollution reduces the risk of CVD, [xxvi] asthma, COPD exacerbations, and allergies. Greenhouse gas emissions, ultimately are stabilized at 402ppm.

Worst Case Scenario: The Inertia Theory

In 2039, the United States is unable to sustain its greedy energy consuming population. The Army's need for energy competes with the local population and the Force competes to live on post because of the economical value and ability to consume energy. Basically, in short, the Army is behind the eight ball in R&D of alternate energy sources and depends on its allies for alternate fuels. The cost of gasoline for POVs has raised to $20 per gallon and most Soldiers ride motorcycles to work to offset the cost of fuel. Motorcycle fatalities have risen over 80% in the past ten years. Families who live off post cannot afford to drive to post to use the commissary or other military facilities. This causes isolation and fractionation within the Forces. Families do not value military service and think of it only as a stepping-stone into the civilian workforce. Those families lucky enough to be housed on post do not venture off the installation and thus, do not interact with the local communities. Soldiers begin to recognize how isolated they are becoming and begin to find other Soldiers living within their neighborhoods off post. This helps them establish carpools and sharing resources. The Army establishes government transportation (buses) for post runs. Electric cars were never accepted by the American public and never fully designed. For these reasons, the Army provides public transportation to its members and beneficiaries however at a minimal cost. The availability of fossil fuel has increased its price so much to make it unaffordable to more than 50% of the US public. This phenomenon has tipped the political power base from US and our allies to Iraq, Iran, Russia (Caspian Sea), and Venezuela. On the other hand, Saudi Arabia, our close ally, now refuses to sell petroleum outside its borders after discovering a calculation error in their petroleum reserves, leaving their stores severely depleted.

In 2039, the cost of everything has soared because the cost of producing and getting items to market has tripled. Heating and cooling costs have also increased extraordinarily. For these reasons, the US is forced to begin aggressive research and development on finding alternate energy sources. It took us decades but finally we were ready to listen. The US cannot afford to depend on our neighbors. It is every nation for itself. Everyone is in the survival mode. Only those countries that planned decades in advance have been able to mitigate the impact of the loss of available, previously cheap petroleum fuels.

Like a chain reaction, food costs are not shielded from these exorbitant costs. Healthy foods cost more to produce and deliver to the commissary. This severely impact the health of the Army as Soldiers and families cannot afford to eat healthy foods and obesity and nutritional deficiencies rise as families are forced to choose cheap processed foods (high carbohydrates) and corn-fed animal products to satisfy their family's hunger. Increasing numbers of Soldiers are forced to accept food stamps just to make ends meet. Families are irritated, hungry and are unable to cope with stress of work and the stress of society. People living off post feel afraid of their neighborhoods and do not go outside to play. Crime increases off post. The social gap for those living on post and off post is great. Army retention is higher for those living on post because this cohort has quick access to social networking on post unlike their counterparts. Suicide rates are lower as well for those living on post. However, general societal stress is high on installation and rapes and other crimes of violence are on the increase.

Medically speaking, nutritional deficiencies, birth defects, infant mortality rates, chronic diseases, cancer rates, and behavioral health illness begin to skyrocket. Obesity is at epidemic levels in the family members and is now rapidly spilling over into the AD population. Exercising on post becomes challenging secondary to the smog and pollution coming from the local communities. Army personnel and their families are reluctant to exercise or even go outside. Exercise rarely occurs outside unit participation. The parks are empty as are the baseball fields. Cases of asthma and cardiovascular problems increase because of the overall air pollution.[xxvii]

In order to meet force projections, the Army reduces its physical standards to retain as many people as possible. Because of increased poverty in the community, more recruits enter the Army just to feed their families and have access to affordable health care. The Army begins accepting the dregs of society into our forces. Poverty rises on post and thus crimes increase. Military police increase surveillance to deter any potential activity; however, because the MPs too are poor and stressed, they take kickbacks. Overall, crime rates increase on all military posts. In short, the Army community is in chaos and is clearly in a death spiral. This severely affects national security and the Army questions its ability to react to even the smallest threats by other nations.

On Army post, recycling is occurring however not at any great neck speed. America sends its trash to Canada and Mexico because it is cheaper than recycling our own. Taxes now are 60% to offset energy costs, recycling, and national healthcare costs. Tourism drops in America because of the crime rate. Those citizens financially stable choose to live as expatriates, some floating along in cruise ships, others living in Central and South America. Burglar bars are clearly visible on every home in America to include those on-post houses. The cure for cancer never occurs because the country cannot afford R&D and thus healthcare reform never really gets off the ground. Alternate energy projects are not funded because politicians cannot convince the American people and industry to dig deeper into their empty pockets to pay for expensive projects. In the end, the United States is culturally and fiscally bankrupt, losing our ability to be proactive, hoping that we can defend ourselves if necessary.

Surprising Successes: Moving Beyond Green

Because the United States was willing to adapt to global pressures (G8 Summit 2025) and move forward joining the other nations in developing an eco-friendly world, the Army has been able to

prosper as well. Recruitment and retentions have risen far beyond expected rates. The Army is able to select recruits and grow a professional elite force, even choosing from within, as many dependents recognize the high value of being a member of the best Army in the world. Patriotism is revitalized. The social infrastructure established on post promotes community collaboration and security. The installation is buzzing with activity as beneficiaries are on the move, actively engaged in physical activity and interacting with each other. The installation gives to us a sense of peace and tranquility. Stress is reduced. Greenhouse gas emissions stabilize as CO2 is stabilized at 390ppm. Stabilization of carbon has indeed stabilized the climate. Destruction by extreme weather (hurricanes, et. al) is reduced and the nation has a reprieve from natural disasters. Insurance rates decline. Building "green" homes becomes more affordable. Because of the Army's embracement of green communities, eco-friendly communities spread to nearby civilian areas. Everyone now is recycling, looking for ways to conserve the earth, and improve healthy living. Harvesting alternative energy helps reduce overall energy cost down to the consumer. Recycling puts money back into community organizations increasing scholarship and education to our youth and geriatric centers for our growing elder population. The girth of Americans is declining with an average BMI being 27. Behavioral health diseases are at an all-time low. As epigenetic therapies become safe and accepted, morbidity and mortality rates are reduced and chronic disease and cancers are avoided. The population ages in a healthy and cost effective manner. People are held fiscally accountable for the health and rewarded for their healthy lifestyles and preventive measures. Healthcare reform regulates healthy lifestyles. In the end, the US Army is living green and is revitalized, capable of doing any mission, anywhere, any time.

Conclusion:

In 2039, AMEDD's collaboration with Amy planners to ensure and sustain a healthy Force requires designing eco-friendly and pro-health communities capable of recycling itself for any mission and maximizing the inherent (genetic) strengths of its manpower. Recycling Soldiers is the strength of the Army. By exposing Soldiers to environmental greenness and living a culture of healthy lifestyle choices, Soldiers and their families are more resilient in reacting to the demands of the Army and society. Healthy living and disease avoidance results in cost savings for AMEDD with reduction in many chronic illnesses, such as cardiovascular disease, diabetes, asthma, depression and suicide, and strengthens the social bonds of Army members. Technological developments, such as iPS and epigenetic therapies, emphasize how environmental exposures play key roles in expressing genomic outcomes. As the Army optimizes the use of alternative carbon neutral fuels by harvesting from the earth and space, and perhaps even controlling the weather, AMEDD's mission will shift towards avoidance of chronic diseases and prevention of new threatening infectious diseases. Designing healthy tools (eco-friendly recreational activities) into Army communities promotes physical activity, reduces stress and high risk behaviors, and ultimately promotes retention and recruitment. More than not, it results in enhancing bonds between service members and strengthens Army core values. Local communities rave over the Army's intense change in culture as they continue to struggle balancing fiscal responsibilities with civil order. In conclusion, promoting alternative sustainable carbon neutral energy is a moral and fiscal responsibility. Ultimately, "living Army Green" conserves the Forces, improves National Security, and strengthens and revitalizes us from within.

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The Mind of the Warrior: Producing Psychological Body-Armor for the Army - Anna Courie and Kym Ocasio

Resiliency is maximizing the readiness, war fighting ability and work performance of our Soldiers and Family Members and allows them to quickly recover. In order to promote this trait, the Army must enhance the well-being of the Total Army Family by wrapping them in education and services that allow the Soldier to rebound from traumatic mission events and to return as a functioning member of society. Consequently, traumatic events to individuals that may result in tragic repercussions (such as suicide, homicide, PTSD) that ripples and impacts the community in which these events occurred. Resilient war-fighters must have "Army strong" minds, bodies and spirits in order to face the stress and hazards of the future battle field. Similarly, resiliency can also be built into military communities in which the relationships within that community foster resiliency. Therefore, the research, training, environmental, and leadership capabilities of the Army must revolve around integrated and holistic training that focuses on the mental, spiritual and physical balance necessary for their emotional and psychological well-being.

War in the Future:

War and conflict will continue to happen in the future. There is the potential for state-on-state conflict on the horizon between the United States and Iran, Russia, China or North Korea. War will be played out on the fronts of land, air, sea, space and cyberspace. Nuclear threat will remain a player as a check and balance against unstable political structures. He who has the biggest gun will remain safest. Overpopulation, climate change, disease pandemics, power struggles and available resources will impact the stability of various regimes throughout the world and how they react to their neighbors. Accordingly, the US must remain a strong military force not only as a deterrent to threatening regimes, but also as a model of ethical rule of law for mediating conflict. How we go about engaging in these conflicts and on what front will be transformed over the next 30 years.

Technology will become increasingly advanced in future warfare. This fact begs the question of how much individual involvement will be required of the war-fighter to kill in a one-on-one situation. There are two fairly divergent schools of thought on this important issue. One group maintains there will always be the human dimension in warfare and that the requirement for highly trained ground soldiers to take the fight to the enemy will never go away. The other school posits the need for a large Army will diminish as our capabilities to destroy enemies from afar will negate the need for an "Army" to deploy to enemy battlefields. Rather, we will be able to deploy missiles, radiation, robots, sound wave technology, radar or other means of killing from great distances. This increased technology will reduce the interpersonal impact of death on the individual required to kill for his or her country. Does this result in a warrior community that needs ethical and moral education on "Playstation warfare" to provide for a well soldier? When killing becomes relegated to a video game event, we have dehumanized death. America is not in the business of unethical warfare and thus the burden of war will remain on the shoulders of individuals who are called to serve. War will not only affect the individuals involved in the engagement, but also on the people and nation of America. Americans have strong opinions on when conflict is ethical and they will become vocal about the risks they are willing to take. With robotic warfare, some of the ethical choices may be

improved as the ability to make better decisions about where to attack is improved with technological advances. Mistakes can be reduced and therefore, unintended atrocities can be mitigated. This will develop in new rules of engagement to ensure that ethical decision making in conflict continues to play a part no matter the degree of robotic involvement. Without human choices involved in conflict engagement, there is no one to follow the ethical rules of engagement. Despite degrees of technological advancement, there will always be the need for humans to make ethical and moral decisions as a part of the warfare in which we engage. Consequently, there will continue to be psychological impacts of conflict whether with direct engagement or from a far. As a result, it will always be necessary to equip the entire soldier—mind, body and spirit—in armor, both physical and mental, strong enough to withstand the rigors of his/her job.

The complexity of the impact of war on the individual resides in a deep seated understanding that killing is wrong. From social, religious and moral taboos, individuals are generally brought up within the social norm that killing is not acceptable. When it comes to training warriors it is necessary to immunize them against the effects and conflicts between the societal norm and the required mission. Our future soldiers may find themselves in a situation where they must strike a balance between two opposing and contradictory worlds. By day, they might be remotely killing enemy soldiers in a distant country from their home station computer terminal. While this can reduce the overall number of collateral deaths in conflict, it also develops a scenario in which soldiers are picking and choosing enemy contacts that can be taken out on an individual basis. At the end of their duty day, these same soldiers will drive home to coach soccer games and read stories to their children. Indeed, some of our soldiers, such as Unmanned Aerial Vehicle (UAV) pilots are already experiencing this phenomenon in the conflicts we are currently fighting. These situations can develop "God complexes" for individuals which can lead down the road of increased psychopathic behavior. Recent research shows these soldiers are more prone to exhibit signs of Post-Traumatic Stress Disorder (PTSD) than soldiers deployed to the conflict theater. We can only anticipate examples such as these to proliferate in the future as our use of robotics and UAVs increases. The AMEDD will need to prepare itself to deal with a variety of psychiatric consequences of virtual warfare as well as address the levels of ethical and moral development of the soldier to improve our ability to make ethical conflict decisions.

By 2019, both aerial and ground combat vehicles will be unmanned and controlled from a point behind combat lines. By 2029, we will have robotic soldiers, although whether the technology of creating a "smart" robot, one that can discern combatants, is still questionable. By 2039, the potential for an entire robotic force is within the realm of possibility, but again, the degree of human involvement and dimension in the aspect of war will be a grey area. We will be on an ethical pinnacle of how robots can make an autonomous decision in identifying when killing is indeed the correct course of action. For the first time, we will have a group of soldiers that are acclimatized to mission execution through computers as many of these soldiers will have been brought up with video games and video game controllers that will mimic the war environment at the office. Desensitization will have occurred long before recruits enter the Army.

The positive impact of roboticized warfare is the diminished loss of the valuable soldier and fewer collateral losses from error. It also allows for the maintenance of high level combat operations without human fatigue and may diminish the psychological trauma to the individual required to kill. We may have a healthier force as the result of robotic warfare. However, the flip side of the coin is that we may create a situation in which killing has been desensitized as in video games. "In an

interview with CNN, Captain Matt Dean, a UAV pilot, noted that "seeing bad guys on the screen and watching them possibly get dispatched, and then going down to the Taco Bell for lunch, it's kind of surreal." When the ability to command large numbers of killing machines is in the hands of an individual, they must bear the burden of responsibility of using those machines correctly.

Our future Force must be adequately prepared to face this moral and ethical dichotomy. They must be prepared to return to an environment in which they must behave as a functioning member of a community structure in which killing is generally considered amoral. Community structures need to have a strong sense of *esprit de corps* and a strong sense of membership and belonging for the individuals. This relationship building and membership creates a structure and safety net so that individuals do not feel alone. Structures that alienate individuals or groups (different command and control lanes—no sense of "us" and more of "them") set a precedence for aloneness. Strong communities are made of strong individuals and vice versus. For this future force, the development of a balance between required/ethical killing and healthy relationships outside of the war-fighting structure will be absolutely essential. Additional ethical training and psychological resiliency will be a necessary component of teaching Soldiers to command robotic troops.

Hence resiliency: the balance between required killing and healthy relationships. In order to build strong minds, strong bodies and strong spirits the war fighter of the future will have training requirements that incorporate mental, spiritual and physical exercises as a part of their war fighting capabilities. This could be a return to the ancient Chinese warrior development that includes activities of mental, spiritual and physical balance as they train their bodies and minds to separate the act of death from their interaction in society.

If we look at stages of emotional intelligence of self-actualization we can build psychological body armor for Soldier, Family Members and communities based on their development level in relationship to the mission they are ordered to execute. First, the Army can and does ensure for physical health and safety at the installation level. During combat, because the individual has been removed from the immediate threat or danger by remote conflict, the immediate danger to the physical self is removed, therefore creating a situation in which we need to ensure the safety of the mind. The dichotomy of psychological hardiness is to allow the individual the opportunity to self-actualize in the midst of a situation that causes psychological threat. Therefore, the Total Army needs to create a sense of belongingness (build community relationships as well as individual relationships so that individuals do not feel alone); foster self esteem and worthiness as a part of the team; create a balance of spiritual peace against the ramifications of taking life and create a reality of virtual warfare that creates moral decisions without causing damage. As we build upon these developmental levels, the Soldier will need to understand the why and impact of virtual warfare and come to a state where he/she ran problem solve in the midst of warfare and accept the facts of the situation. Ultimately, creating safety nets, relationships and sense of community will also allow us to transcend conflict and develop problem solving modalities that do not result in death. A breakdown of the soldier, family member or community will occur when one or more of the fundamental needs are threatened.

The requirements of the Armor for the future include:

1. A healthy body: attention to physiological needs, fitness, food, sex, oxygen (clean air), and safety. A healthy body, houses a healthy mind:

2. Mental resiliency: tactics for sifting through reality and virtual based information and actions, rules of engagement that are built upon virtual warfare and what is acceptable engagement from a far both ethical and moral; coping strategies for fear and desensitization, education, training and research on rationalizations of virtual conflict; problem solving methodologies to offset potential conflict. Mental and physical hardiness rests on a strong spirit:

3. Spiritual Hardiness: Acceptance of the burden of death without damage to the individual as the whole: foster mentoring programs that allow combat warriors to train new recruits and share their combat experience (this also develops a relationship that builds a needed structure for the individual); develop "zen" technology that fosters spiritual development and peace at the same time recruits are developing virtual war-fighting skills. If exposure to repeated virtual combat, causes a desensitizing impact, then we must address "re-sensitizing" methods and technology that encourage healthy emotional and psychological responses to humanity. Developing "time slots" that allow for spiritual recuperation. Right now, we focus on physical fitness to a degree that there is little time to develop and nurture mental and physical well being.

When we create a balance between mind, body and spiritual health, we are creating a homeostasis within the individual. If there are problems within one of the dimensions, there will be ramifications and impacts on the other dimensions. Because traumatic events are not solely the consequence of war, psychological resiliency for individuals and communities allow them to rebound from any event, whether war, or disaster or acts of God.

Currently, the Army is assessing the mind, body, spirit impact and identifying trends and characteristics of resilient Soldiers and Family Members. The resilient individual has strong relationships, some type of spiritual background, has the ability to reason through difficult situations and has a healthy body. In 2019, these characteristics will be used to build training programs that fully maximize human performance capabilities. This focus will enhance the mental and physical resiliency; reduce the burden of injury and illness; foster rapid recovery; and utilize the existing technology to accomplish the mission and maintain peace. As we develop the training programs to foster these resilient individual characteristics, we will then take the next leap in 2029, to utilize bio-metric monitoring systems for the medical treatment services to respond on demand to the bio-metric status of the individual. We can use these feedback systems to identify additional training, or supportive services to maintain the homogenous-resilient state of the Soldier. By 2039, if killing becomes like a video game, it may be necessary to build in empathic feedback responses in order to maintain the moral/ethical clarity and impact of killing from a remote location. Otherwise, the risk to the community of a trained body of indifferent killers could be great.

Health professionals will add a complex level of care to their healing—building resiliency in the individual warrior-soldier. This will include helping the warrior soldier find a psychological balance in the ethical/moral cost to killing and having healthy relationships with Family, friends and colleagues. The ideal prevention of the killing impact and building of psychological body armor will ideally be incorporated into the training from day one entrance into the Army. Soldiers will be screened for risk factors and targeted training will be developed to take risk behaviors and turn them into warrior behaviors. Risky behavior is a sign of an individual who is willing to take chances. The opportunity here is to facilitate a process that channels risk behaviors into thought process development that allows the individual to focus this energy into creative problem solving and allow

them to execute "outside the box" thinking for the rush of taking a risk. Our greatest Army leaders were those that were willing to take a risk with outside the box thinking and we should foster these opportunities for individuals to take risks through problem solving opportunities. Even people with risky behavior tendencies are an opportunity to channel that energy for positive results. Warrior behaviors will utilize the rules of engagement, even in virtual conflict, to make moral decisions, develop peace with that decision and follow through with the consequences. Traumatic events to not have to be damaging events, they also provide the opportunity for growth and development. Leaders need to take the immediate opportunity following conflict to discuss the "why" of the event and come to a common understanding of the necessity of the conflict. We should also take the opportunities as times to discuss alternatives to the conflict. These are opportunities to ultimately try and transcend warfare.

Another such option would be implanting neural stimulus devices or drug delivery devices that would alter the behavioral impact of traumatic stress. This would reduce the psychological/spiritual impact of war and/or use such a device to "turn off" risk behaviors as a product of the traumatic experience.

Our experiences with risk behaviors, suicides and poor response to the war environment shows us that soldiers with pre-existing mental/behavioral disorders, alcohol and drug issues, legal, financial and relationship problems will be the soldiers that have a higher risk factor for PTSD, mTBI and other problems following a combat experience. As a result, these soldiers come in with poor resiliency and the question is whether or not we can build protective factors? In the next ten years, the Army will need to formalize the standard of imbedded health professionals on the brigade and/or battalion level that foster health as a part of the unit environment. These assets will then become a part of the unit culture and be available for on the spot assessment of physical, psychological and spiritual impact of remote and onsite warfare. These "brigade health promotion teams" would work in an integrated and multidisciplinary process to ensure the holistic well being of their assigned unit.

If we develop the training accordingly at the same pace in which we invent the technology, then we build armor around the psyche of the Soldier so that war does not become a PlayStation game at work. Alienation from that which makes us human can result in just as much psychological damage as the current impact of killing on the human dimension that results in PTSD, mTBI, depression, psychosis and suicide. While we may not have the manifestations of these diseases as a result of "de-humanizing" war, we still maintain the risk of psychological impact through excessive desensitizing, lack of emotion, moral and ethical implications and casualness/carelessness of warfare. This can translate to communities of people who do not recoil from random killings because it has become the norm. How do you make killing "Okay/Not-Okay?" This is the ultimate requirement of the military.

Although the health of the Force can be addressed at any time, protective factors need to be built during warrior development, not as a postscriptive treatment. Resiliency must be taught prior to the eruption of the problem behavior. As a result, resiliency is built into the armor of the warrior of the future and soldiers are taught a balance between their social/personal relationships and the work required of a killing machine.

Recommendations:

1. Implement study on the psychological impacts of soldiers who are involved in combat directly verses soldiers who are involved in combat from remote locations by controlling the UAVs or other robotic soldiers.

2. Incorporate mind, body and spirit training into the training cycle that incorporates mental and spiritual strengthening along with physical conditioning—make it the norm to include mind-body techniques that make the soldier operate at a higher performance level.

3. As combat changes, there will always be a human dimension to killing and thus a psychological impact. Address ethical training in combat relations as war becomes more technological. Address changes in the rules of engagement and include ethical and moral implications of choices.

4. Address technological tracking mechanisms for soldiers that monitor stress indicators and identify the threshold level needed to intervene or provide psychological rest and recuperation.

5. Foster Army communities of resiliency in Soldier, Family and Civilian relationships.

6. Assess cost-benefit ratio between use of robotics and soldier resources.

7. Incorporate Holistic Health Promotion Teams into the brigade or battalion structure.

8. Research virtual programs that foster mental and spiritual hardiness in conjunction with or in contrast to, the "playstation" warfare modules.

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Community Health Capacity – COL Robert Mott

Introduction

This paper attempts to answer two questions: 1) who builds the capacity for future communities, and 2) who is accountable for community function and wellness? The paper also presents two future visions of community capacity (one somewhat gloomy and one more positive) and provides recommendations for MEDCOM on actions that it can take to function effectively within those scenarios. However, before launching in to these discussions, it is important to understand what is meant by community capacity and community health.

To paraphrase Webster, "capacity" is the ability or power to produce or perform. Having "capacity" is to be "capable" which is having a general ability or efficiency. Community capacity then is a community's ability to produce what is needed and perform community functions with a general level of ability and efficiency. Substantial effort has gone in to community capacity building, particularly in developing countries and impoverished communities in the United States. These efforts include building capacity in the underlying policy and legal framework, human resources development, community participation, organizational development, and the improvement of management structures and processes. How then does a community's capacity apply to the health of that community? To answer that it is important to first understand the determinants of community health.

Since 1948, the World Health Organization (WHO) has defined health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." This definition reflects Abraham Maslow's hierarchy of needs published in his 1943 paper, *A Theory of Human Motivation*. Maslow's theory describes levels of human need that progress from the most basic physiological functions and requirements (air, food, water, reproduction), through safety and security (body, property, resources, employment), then love and belonging, esteem, and finally self actualization. Other "determinants of health" include personal behaviors, the physical environment, safety and preparedness, food and water quality and security, living and working conditions, mobility, income, education and literacy, social support networks and inclusiveness, and life skills. It is clear from these broad concepts of health that traditional medical and public health systems are only part of a community's capacity to maintain and improve health.

A number of individuals and organizations support a community's capacity to sustain and improve health. These include caring, involved families and citizens; local business and industry; public utilities; government officials; financial institutions; police and justice systems; emergency services; agriculture; faith organizations; supply and transportation systems; community planners; builders; schools and other educational organizations; civic, cultural, and arts organizations; community foundations; the media; recreational groups; research organizations; advocacy groups; and finally medical and public health organizations. These organizations and the critical functions they provide form the foundation for a healthy community.

Community health capacity for military communities adds layers of complexity. Military communities have their own governance and support structures but they also fall into the broader local, state, national, and even international communities in which they are located. Military

communities must follow DoD and Service policies and federal law but they also fall under certain local and state laws and status of forces agreements. Also, very few military communities are self contained. Most rely heavily on the surrounding civilian community for housing, schools, transportation and supply networks, utilities, retail stores, emergency response and police services, medical referral, public health, and a myriad of other services. It is therefore important to think about community capacity in terms of the broader community both inside and outside the gates of an installation. It is also important to consider the current trends of joint basing and privatization, two DoD programs that directly impact military communities.

Local communities, both civilian and military, are directly and indirectly impacted by state and national policies and programs. Fiscal policies and taxes, environmental regulations, labor laws, health laws, immigration laws and enforcement, contract laws, and many others impact local businesses, governments, and citizens. Military communities are often impacted even more by national whims.

So, what could possibly go wrong?

2019

The US economy continues a gradual slide that began after a marginal recovery between 2010 and 2011. Large federal spending programs propped up the economy for a few years but the level of funding was unsustainable and new technologies are struggling to take hold. Interest rates began to rise in 2013 as money was printed to pay interest on the debt.

Manufacturing jobs continue to be lost overseas causing higher rates of unemployment and underemployment. This causes a loss of the tax base at the state and local levels. As a result, local governments are forced to cut services and communities around Army installations slowly begin to deteriorate. The first programs to go are parks and recreation programs and cultural events. Parks are not maintained and are not family friendly. Sports fields become bare or overgrown and fewer kids come out for organized sports. Sedentary lifestyles become even more pervasive and obesity is becoming the norm. Core government services like police and fire departments, building inspectors, and public health departments also take a hit as local governments struggle to balance their budgets. Crime rates begin to rise and government enforcement of building and health codes is reduced substantially. Spending on public utilities is decreased and needed upgrades to the water, sewer, and power systems are put on hold. Aging systems begin to break down and water main breaks are becoming more frequent.

Low wage service jobs replace higher paying manufacturing jobs and most couples are forced to work to make ends meet. Stay at home moms and dads are becoming relics of the past. Public school funding also suffers and "non-essentials" like music and theater programs, physical education, and even prized athletic programs are cut. Kids are forced to spend more time at home and many "latch-key kids" spend unsupervised hours with the TV or out causing trouble with friends. School maintenance is deferred and funding for new school construction is routinely voted down in local elections. Teacher salaries continue to lag behind other careers and teacher hiring and retention in communities around many Army posts is difficult. Schools are becoming overcrowded

and unappealing. Army parents are becoming concerned about the quality of education their children are receiving.

Military funding has been relatively stable because of almost continual international conflicts. However, installation maintenance and improvement projects have taken a back seat to refitting the warfighter. The op tempo has continued at an unprecedented level as the war on terror enters its 18th year. Recruitment and retention of military personnel has been poor for the past seven years and base support is now totally reliant on civilian employees and contractors. Joint Basing has been completed on many posts. However, the program was too often used to reduce costs resulting in degradation of base services. Privatization of many installation services has helped the local economy but military involvement and oversight have been greatly reduced. Total reliance on the local civilian community for drinking water, electrical power, and sewage treatment is seen as a potential vulnerability.

Real political leadership is needed at all levels but it is in increasingly short supply. The notion of service has been replaced by partisanship and personal gain. Talented, caring individuals who try to serve constituents are sidelined or politically destroyed. Few exceptional people are willing to enter political life and the leadership capacity of government suffers.

2029-2039

American society is sliding down Maslow's hierarchy of needs. Love and belonging, esteem, and self actualization are losing out to concerns about safety and security and other basics of life.

The United States is no longer a leader in the global economy. Years of questionable monetary policy and shifts in global markets have caused the US to slip to the number fifteen economy behind much of Asia and a resurgent Eastern Europe. Environmental and labor regulations have become so burdensome on manufacturing that most companies have chosen to leave the US. Wages in service industries have failed to keep pace and most Americans work in low paying jobs. Expanded federal entitlement programs, the aging population, and failing industrial base have combined to cause a fiscal crisis and inflation rates are consistently in the double digits. Local, state, federal, and numerous "sin" taxes have virtually eliminated real income and a majority of the US population is now dependent on the government to survive. Unemployment in most of the country has been hovering near 20% for a decade and crime is rampant.

The basics of life are no longer a given. Water supplies in many parts of the country are dangerously over-tapped. Some communities have literally dried up and disappeared. Others rely on huge pipelines, desalinization plants and other expensive solutions that take funding from other basic services. Food supplies are increasingly threatened by insect pests because many pesticides have been banned. Quality housing is unaffordable for a large portion of the population and large government housing projects are making a comeback.

With the increasing demands of work and financial survival, fewer citizens are becoming involved in neighborhoods, churches, and civic organizations. Neighbors don't know each other and rarely talk outside the occasional hello as the garage door closes in the evening. Bureaucratic government programs have replaced local support systems. The media, in an effort to be noticed in an

increasingly crowded market, celebrates deviant behavior and attacks traditional values and institutions. This further reduces the strength and vitality of traditional cornerstones of society. The nuclear family is fading into obscurity. Social safety nets that have been around for generations are fraying badly and people are feeling increasingly isolated.

American education is now in full crisis. Elementary and secondary schools are in such poor shape that test scores in parts of the country parallel the developing world and dropout rates are at epidemic levels. Illiteracy is up and an increasing proportion of the population does not speak English. The great American melting pot is failing and the "Balkanization of America" has fostered fear and mistrust within and between communities.

Seven years of tenuous peace has made the Defense budget an easy target as Congress and Administration officials look for ways to cut government spending. Many bases are closed during an unusually aggressive BRAC process. Remaining bases are falling into disrepair and are increasingly reliant on the local civilian community for housing and services. This is not a good solution, however because local communities have also been hit hard. Cooperation between installation leaders and local civilian leaders is strained. Army posts are no longer the steady source of local revenue they once were.

Socialized medicine, fully implemented in 2032 has dramatically changed the face of health care and reduced the appeal of medicine as a profession. Clinicians are viewed more as technicians who follow computer algorithms than highly trained, caring professionals. The best and brightest ignore medicine and choose careers with better pay, shorter hours, and more professional autonomy. Primary care is now available for the general population but advanced care is rationed and denied to patients who do not meet government-approved standards for age and health status. People with poor health behaviors like smoking, unhealthy eating, and substance abuse are either denied care or forced to pay steep premiums. Health promotion and behavioral health programs are cut because they lack "bang for the buck."

Government leaders have cut military medicine to the core, choosing to rely on the civilian national health system rather than a separate DoD system. The only medical personnel in uniform are those directly assigned to deployable units. The elimination of professional feeder systems (HPSP, USUHS, etc.) and frequent deployments have reduced interest in serving in the military to such an extent that a medical draft was implemented in 2037. Morale and quality of care are understandably low.

Public Health has also taken a hit. Advocacy groups and law suits have systematically eliminated most of the vaccines and medications available to prevent disease outbreaks. Public Health officials have been retroactively held liable for population interventions they implemented using the best evidence available at the time. Juries are swayed by tragic rare adverse events but ignore the benefits gained by the majority of the population. The only remaining polio vaccine manufacturer was forced into bankruptcy by a huge legal settlement in 2030. Polio returned to Central America in 2035 and is starting to march north. Diphtheria, measles, and tetanus are now common in large cities. Similar social forces sent a chill through the medical research community, exacerbated by a Supreme Court ruling upholding the criminal convictions of a research team that failed to identify a severe rare complication from a new antiviral therapy. Few scientists are willing to risk jail time to

push the boundaries of medical science and many are moving to countries with more rational legal systems.

It is apparent that community capacity in this depiction of 2039 has been severely degraded. This community's "ability to produce what is needed and perform community functions with a general level of ability and efficiency" is in peril. Families, churches, and community organizations have lost their vitality and influence. Community pride, self reliance, and cooperation have been replaced by dependency, social isolation, and mistrust. Governments are failing to provide essential services. Major industries, businesses, and financial institutions have closed or chosen to leave the country. Educational systems are failing to teach core knowledge, values, and skills. Cultural and recreational programs have been eliminated as more pressing needs consume limited resources. Transportation systems, utilities, housing, schools, and public buildings are in disrepair. Medical, public health, and medical research systems (to include those in DoD) that were once the envy of the world are now almost unrecognizable. Funding for the US military has been slashed and military communities are suffering in parallel with their civilian counterparts. Military communities are increasingly reliant on civilian communities that are frequently on life support themselves.

The result of failing community capacity is a generally poor quality of life and high rates of destructive behavior, crime, physical and mental illness, and death.

What should the military do to sustain and improve community capacity?

1. Leaders must understand that the military community has a stake in the local civilian community and partner with them on local issues and programs. Medical and installation leaders must intimately understand the community outside the gate and provide ideas and support where possible. They should help foster an environment of excellence and community pride. For example, the installation can support community events such as Fort Leonard Wood hosting the Special Olympics. Military posts can support community enhancement programs in partnership with the local civilian community.

2. Military families should become involved in their communities both on post and off post. They should be encouraged to participate in community activities, coach sports teams, serve as scout leaders, look after neighbors, host book clubs, support institutions that strengthen the community, and try to help solve community problems.

3. DoD should partner with civilian programs to keep kids in school, improve their level of fitness, and develop character and citizenship. One example is the Army sponsoring radio spots that attempt to keep kids in school. Installations should be involved with, and possibly have an ex officio seat on school boards where military children make up a sizeable proportion of the student population. Insist on mandatory physical education classes and music and arts programs. Installations can also sponsor science fairs, marching band competitions, speech and debate contests, community theater, and other educational and cultural activities.

4. Military leaders must have a voice as citizens on critical local and national issues within the boundaries of laws and policies. Military personnel are high quality citizens and they should

add their voice to important local and national debates. Dramatic changes are being proposed at the national, state, and local levels and citizens in uniform should be heard.

5. Military medical professionals should effect change through their professional societies.

6. Installations should be involved in local emergency planning and response capacity building and coordination.

7. MEDCOM and the Army should increase support for programs and research activities in health optimization, public health, and community health. The military should also advocate for reasonable legal and policy standards for medical research and population health programs.

8. DoD should carefully study the impact of decisions to drastically alter or civilianize military health care and advocate for the most appropriate courses of action. Army Graduate Medical Education should be jealously protected.

9. Continue to improve the physical environment (housing, etc), recreational opportunities, cultural activities, and social support systems for military personnel and families, even in the face of budget cuts.

10. Protect the installation's ability to oversee and inspect programs and processes that have been privatized such as housing, food service, and drinking water production and distribution.

11. Community leaders must understand the health and well-being of their community. They should develop meaningful metrics and collect and analyze data over time to monitor how the community is doing. This would ideally be done in partnership with the local civilian community.

12. Retired military personnel and veterans should serve their communities and country by running for elected office, taking other community leadership positions, and joining or forming community organizations.

Appendix 4: Science and Technology (VWG 4) Individual Papers

Regenerative Medicine and the AMEDD of 2039 – COL Scott Goodrich

When scientists in 1850 first noted that under certain conditions some types of cells could actually produce different types of cells, the significance of this cellular behavior was not fully appreciated. Study of this unusual process did not resume in earnest until the 1970s when the ability of these "stem cells" to differentiate into other cell types led to discoveries that made bone marrow transplantation possible. When viable embryonic stem cell lines were produced in 1998 the moral and ethical issues that ensued soon caused researchers to shift their focus to "adult stem cells"; which are normally present in most tissues but can differentiate into other cell types when the tissue is in need of repair. By 2006 researchers had learned to stimulate these adult stem cells to differentiate into other cell types, and it was the study of these "induced pleuripotent stem cells," that gave rise to the discipline of Regenerative Medicine.

AMEDD Current Status

The AMEDD, recognizing the potential value of Regenerative Medicine for its combat-injured Soldiers, proved itself an early adopter by establishing and funding the Armed Forces Institute of Regenerative Medicine (AFIRM) in April of 2008. This Army led collaboration of Federal, Academic, and Industry partners, managed by the U.S. Army Medical Research and Material Command, set its first five priorities as burn repair, wound healing without scarring, craniofacial reconstruction, limb reconstruction, regeneration, or transplantation, and compartment syndrome.

AMEDD Strategic Interests

The burden of suffering our wounded Soldiers bear and the economic cost of returning them to health and productive life is staggering. Not only does the AMEDD have a moral obligation to pursue Regenerative Medicine to repair what war has wrought, but we have strategic reasons for doing so as well:

- First; neither the Army nor the Veterans Administration can long bear the growing cost of prolonged disability care or disability compensation for our war-wounded Soldiers.
- Second; Regenerative Medicine does not simply provide treatment, it promises a cure. Soldiers who would otherwise be lost to service can eventually return.
- Third; knowledge that if you survive wounding on the battlefield, the Army will restore you "good as new" is a powerful recruiting and retention incentive.
- Forth; we must set our own research priorities or the civilian sector will set them for us. Curative treatment for traumatic wounding is an AMEDD priority.

Regenerative Medicine Today and Tomorrow

Though the possibilities for Regenerative Medicine are still evolving, numerous advances have already been made.

Current Science:

- Scientists have stimulated regrowth of amputated digits in at least two individuals.
- Skin and cartilage patches are now being used with success and esophageal and heart patches have been developed in laboratories.
- Human trials implanting pancreatic islet cells are in progress. Functional liver and kidney tissues have been successfully grown in laboratories (in vitro).
- Complex structures such as an ear, nose, or face, are now being grown in vitro and are close to human testing.
- Some success has been achieved using growth factors to stimulate wound healing.
- Body parts such as bladders, urethras, esophagus, and cartilage, can be induced to grow into complex 3-dimensional constructs in the laboratory.

Future Capabilities:

- Amputated digits and limbs will be regrown by inducing adult stem cells to differentiate into bone, muscle, blood vessel, and nerve cells. This will be accomplished either in the body (in vivo) by stimulating regrowth from an amputated stump, or in vitro by growing tissues or an entire limb in a laboratory and then transplanting it onto the severed stump.
- Damaged organs will be repaired by harvesting cells and growing tissue in vitro that can then be used as an organic patch to support the organ while it heals.
- Tissue growth factors and other compounds that stimulate adult stem cells to differentiate will be directly injected into damaged organs to initiate regeneration or to inhibit undesirable growth.
- Entire organs will be grown in labs from adult stem cells or induced pleuripotent cells and then surgically transplanted.
- Complex structures such as ears, noses, or a face will be modeled using an absorbable biomatrix that bone, cartilage, blood vessels, and skin grow over to form exact reproductions of the damaged part. Synthetic molecules imbedded into this 3-dimensional biomatrix will directly stimulate cell differentiation and regrowth either in vitro or in vivo.

- Organs will be manufactured "from scratch" using 3-dimensional computer modeling and cell deposition techniques to build organs layer-by-layer in the laboratory.

- Skin and other tissues will be induced to heal without scarring.

The AMEDD of 2039 – A Retrospective

In January 2005, Health and Human Services (HHS) convened an interagency working group on regenerative medicine. In their white paper "2020: A New Vision, A Future for Regenerative Medicine" they predicted that with appropriate federal funding, by 2020 we will see tissue and organ patches and by 2030 we will see tissues on demand. Five years have passed since the HHS published their predictions. This writer believes that if current medical science continues to unfold at its current pace, the HHS vision for Regenerative Medicine will be surpassed by the reality the AMEDD will experience 30 years from now.

- **2019.** Predictably, this first decade saw major advances in the generation and regeneration of simple tissues because much of the basic science had already been done. Our knowledge of growth factors and growth inhibitors now allows us to seamlessly heal most combat wounds and eliminate scars by inhibiting tissue fibrosis. If wound damage is too extensive, skin is grown in vitro and grafted. We have also perfected our ability to grow organ and tissue patches to facilitate surgical repair of damaged or diseased body parts and can do this at all of our Medical Centers. Bone and cartilage growth is induced to grow in vivo using bioactive frameworks that degrade once regrowth is complete. We can now regrow shattered bones and rebuild broken faces. All of our Orthopedic Surgeons now routinely stimulate new cartilage growth for our arthritic patients, and Diabetes is becoming scarce as the injecting of insulin-producing pancreatic islet cells directly into the pancreas becomes routine.

- **2029.** By the end of the second decade, AFIRMS original 5 goals have been fully realized. Digits can now be fully regenerated in vivo, but full limb amputations still requires in vitro reconstruction and transplantation. Despite our new expertise with regrowing nerves, muscles, blood vessels, and bone, we don't yet have the ability to stimulate the body to regenerate complete organized limbs. Moderately damaged or diseased organs are now chemically induced to repair themselves in vivo but organs too badly damaged to repair are regrown at the AMEDD Tissue and Transplant Center (ATTC) and then transplanted. Non-immunogenic organs like the heart, kidney, lung, and liver, are routinely grown at the ATTC and maintained in our Tissue and Organ Stockpile (TOS) for emergencies. This stockpile also furnishes our forward surgical teams with replacement parts, similar to the way we management whole blood. Our retirees also enjoy the benefits of regenerative medicine as death from heart disease and cancer has been largely eliminated using new techniques for stimulating blood vessel repair and for inhibiting the growth of malignant tumors. Spinal cord injuries can be completely repaired, and neurologic disorders like Parkinson's disease and Epilepsy are now considered curable.

- **2039:** Military medicine and the AMEDD have been transformed. We have solved the complex problem of in vivo limb regrowth. Auto immune disorders, heart disease, cancer, diabetes, hypertension, kidney disease, and asthma have either been eliminated, or are easily cured. If a Soldier, or any military beneficiary survives an initial traumatic wounding, it is highly unlikely that they will die. Critically wounded patients are immediately placed into a semi-suspended state (another new medical advance) and maintained on life support while their injured body parts are repaired or replaced. Additionally, the scope of Regenerative Medicine has now expanded from "cure" to "prevention." DNA mapping and detailed biochemical analysis is now routinely used to create a baseline bioprofile for all of our beneficiaries. Every year new bioprofiles are drawn and compared against this baseline as part of the Periodic Health Assessment (PHA). If detected early, minute biochemical changes that may herald impending health problems are easily detected and treated. It is now common practice to receive "preventive treatments" every five years, even if you are not ill. Tailored intravenous treatments activate regenerative cellular activities within your body to maintain you at your baseline state of health and vigor. Overall, visits to our MTFs for chronic disease have been drastically reduced. The majority of our outpatient visits are now for prevention, obstetrics, and health promotion. Many of our inpatient wards have been converted to same-day Tissue Repair Suites, where teams of specialists and interventional radiologists deliver bio-active compounds to damaged, diseased, or failing tissues and organs with pin-point accuracy, normally returning them to full health and function within two to three weeks time.

Alternate Futures and Potential Barriers

Despite the current rapid pace of development, practical application of Regenerative Medicine's promise is dependent on basic scientific research. Without the basic research, medical technology is slow to advance. Basic research does not generate dollars so is entirely reliant on private and public investors and academic grants. Though advances in Regenerative Medicine still occur, without basic research, they do so at a slower pace.

The direction that civilian research takes and the medical applications that evolve will predictably be driven by economics. Basic research and developing products for market is expensive, therefore, those applications developed first will be those with potential for a large and rapid return on investment. Regenerative solutions for chronic conditions such as Diabetes, Heart Disease, and repairing tissues damaged by cancer will likely be seen as low-hanging fruit. While the medical benefits and healthcare implications for restoring the ability of the pancreas to produce insulin, or repairing a damaged heart are incontrovertible, they are not the Army's top priorities.

Recommendations for the AMEDD

Funding for the AFIRM collaboration and other similar joint endeavors should continue at current or increased levels. Setting and funding our own priorities is critical because if we rely on the private sector to provide solutions, then economics will prioritize them for us. The AMEDD and the Department of Defense are in a unique position to foster collaboration and focus research on products that directly benefit our Soldiers. Unregulated science where knowledge is not shared,

slows scientific advance, and slows delivery of the Regenerative Medicine Applications that our Soldiers deserve.

The AMEDD should introduce Regenerative Medicine forecasts into Healthcare Facilities Planning. It is clear that as this science develops, specialized laboratories and transplant capabilities will need to be incorporated into mid-term facilities design.

To speed final approval of Regenerative Medicine products, the AMEDD should promote its capabilities to conduct human trials of early Regenerative Medicine applications. AMEDD Medical Centers, most notably the Burn Center at Brooke Army Medical Center, are already well positioned to support studies of this nature.

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How Science and Technology Will Enhance Medical Education and Training in 2039 – COL Randall G Anderson

New advances in medical science and educational technology will continue to drive the evolution of the techniques and products used to prepare personnel for their medical missions. Two primary themes stand out in this area: 1) Personalized medical education and training for each individual; 2) A continuum of life-long medical education that begins before arriving at the school and continues throughout the Service member's career.

In the broadest definition of terms, "education" is the process of gaining knowledge, while "training" is the process of learning a skill. The military continues to focus on the importance of essential medical skills built upon a strong scientific base of knowledge. By 2039, the preponderance of medical education will be tailored to the individual learner and less structured to a core curriculum delivered uniformly to classrooms of students. Students will be trained to learn through mental skill development. Interaction between written instruction, hands-on practical training, and proficiency testing will become virtually seamless, enhanced by adaptive products that sense and respond to individual aptitudes (strengths) for learning.

Avatars tailored to an individual's specific learning style will assist them beyond the initial training and provide a continuum of education throughout their career. New information on medical issues and emerging scientific discoveries will be integrated real-time to the teaching products, removing the delay experienced by cycle times to develop and update curriculum and textbooks.

Forecasts for Medical Education and Training in 2039

Academic Training Environment

The future academic institution is less focused on general (core) curriculum delivered in a standardized, physical classroom. Instead, military personnel benefit from tailored instruction, delivered in the style that is optimal for each student. Data-rich educational records for new Servicemembers will better match their aptitude, skills, and mental capacity to their occupational specialty and selection for advanced training. Before any medical instruction begins, students are trained on mental skill development to enhance their reading comprehension, critical thinking strategies, and time management skills. Through brain-computer interfaces using dynamic, learning biofeedback, resilience is instilled to achieve maximum results in courses. Competency-based, patient outcome-oriented skills evaluation will replace the preponderance of written examinations that are limited in value to test only the retention of facts. This evaluation of skills is accomplished through motion tracking, sensor data capture, and built in sensing systems that provide unbiased error-tracking and feedback assessments for all students.

Many of the courses are taught through a virtual campus, providing a seamless continuity of training and counseling by a mix of human and computer academic instructors and advisors. With access to a constantly evolving knowledge base, educators and researchers will have a better understanding of

the third and fourth-order effects of the medical techniques taught and the effectiveness of their outcomes. Linkage between the large medical centers and the classroom through synchronous learning modality provides students with real-time case reviews and the ability to train as staff of a hospital while still in school.

Much of the curriculum and programs of instruction are created and maintained through hybrid-wikis. This tool for subject matter expert collaboration allows medical professionals around the globe, even those on the battlefield, to assist in shaping the instruction with the latest lessons learned. The hybrid form of the wiki retains limited access, permission-based editing, and is moderated by school faculty.

Career-long Avatar Assisted Learning

To assist Servicemembers in their continuum of education and training, a personalized Avatar is assigned to them when they first join the military. This avatar guides the new recruit to prepare for the next level of training as they progress through their basic training and advanced studies. The education avatar learns the cognitive traits of the individual and uses the military's extensive training databases to continuously review and evaluate previously learned skills and critical knowledge sets. True benefits are realized as medical professionals arrive for specialized training and education. The personal education avatar assesses each new medical course that an individual is scheduled for and systematically sequences previously unlearned lessons for maximized pre-course development.

Once the medical professional leaves the school, the education avatar remains engaged with them throughout their career, updating them on new medical findings and ensuring they are aware of the latest information appropriate to their profession. The career-long avatar has the ability of contacting its "owner" through all electronic means of communication when medical emergencies occur (i.e. a pandemic outbreak) and advises them on appropriate actions.

Enhanced Learning Devices

Development of Personal Learning Devices (PLCs) will serve as a single "textbook" for all courses, able to wirelessly download text, audio, video, and reference materials for the most updated curriculum and instruction. The dynamic curriculum will enhance the military applicability of the education by making battlefield lessons learned readily available to those training for war.

All new medical equipment and techniques are designed and integrated to require minimal training. Standardization of common components in all equipment reduces the amount of time and effort required to adapt new tools. Medical instruction will be augmented with animated digital holograms, providing three-dimensional diagrams of the entire human anatomy. Interactive holograms will allow realistic visualization of the anatomy under study, with the ability to manipulate the parts for a better understanding, often unavailable with static training models.

Some learning is accomplished through devices that affect cultured neural networks. This interface between computers and the brain is made possible by advances in biocompatible materials, non-invasive sensory leads to the brain, and computational technology that relays data to enhance the

learning capability of students. Students will gain medical knowledge through this brain-computer connectivity, often outside of the classroom and through portable, personal devices that provide education reinforcement of highly complex medical subjects.

Medical Simulation in the "Classroom"

Advances in simulation will continue to enhance the environment for learning in the classroom. More responsive, situational aware models will improve the realism of the increased human-computer interaction resulting in more effective training and reduced mental barriers to working with programmed machines. New advances in simulated tissues and multi-texture human systems will allow realistic training in near-live tissue training. Human and animal mannequins not only replicate flesh-like tissues, but also fluids, sounds, and smells of real patients, incorporating greatly enhanced feedback sensors that respond to treatment and communication from the provider.

To add to the realism of the education, most classroom equipment and instructional methods are greatly adaptive to changes in the curriculum and interoperable with multiple scenarios of training. The physical layout of the "classrooms" morphs, through multi-sensory projection, to the desired environment that matches the simulated location. Virtual walls and virtual medical attendants in the classroom respond to sensors to assist in the education process and add realism. Telementoring and online classroom projection makes the virtual classroom available to anyone world-wide, even deployed personnel undergoing skills training in a combat zone.

Empowerment of all Service members, Civilians, and Family Members to Have a Role in Medical Education

The military has long recognized the benefits of the promotion of disease prevention instead of treatment. Emerging technologies will allow the empowerment of all individuals involved in the military mission, including civilians and family members, to maintain their individual health network. A focus on prevention, with the most current recommendations, is tailored to the personal style of each individual, focused on their most effective behavior modification for optimum health. This adaptation of truly personalized health education will accelerate the reduction of many preventable diseases and increase the medical readiness of the military forces.

Through integrated medical databases and personal avatars, each person will enjoy personalized health advice with the sound backing of the most recent medical science. Health interaction "kiosks" provide remote health professional and computer-assisted testing, diagnosis and advice. The empowerment of all personnel is achieved when the kiosk becomes a dynamic, learning platform that provides relevant, sound medical education targeted at promotion of disease prevention.

Recommendations for the AMEDD

1. Continue to support ongoing education research into outcomes and competency-based training. Embrace international collaboration, effective scientific exchanges with academia, and focusing

education research on advancing outcome-based training. Ensure civilian and military academia research efforts are coordinated to gain the best results.

2. Focus efforts and resources on technologies that meet the strategic goal of clearly superior trained individuals, following a well-coordinated roadmap to ensure that funded projects support the overall objective and are not duplicative. Some funding will be required to support bridging technology to reach this future education & training capability.

3. Increase the information technology (IT) training and development for all medical professionals, including those that develop curriculum and provide instruction in the classroom. Posture the AMEDD training environment to be a developer (and leader within academia) of new technologies and techniques to enhance education throughout the continuum of learning.

4. Consider ethical and legal implications and cascading effects of all new science and technology introduced in the training and education of medical professionals. Make sure there are clearly understood processes to review their impact.

5. Increase public relation campaigns to articulate the AMEDD's achievements in advanced technologies and R&D to recruit higher quality medical academic personnel. Continuously evaluate the requirement for new subject matter expertise, especially in areas such as genomics, molecular imagery, nanotechnology, and medical simulation robotics.

Alternative Forecast for Medical Education and Training in 2039

Budget constraints and conflicting priorities will hamper the synchronization of efforts required to bring the virtual classroom to its maximum capacity. Academic resistance to collaborative development of curriculum will continue to propagate outdated instruction, lacking the knowledge of lessons learned from daily practice. Without proper consideration of ethical and legal implications of new science and technology introduced in medical training, medical professionals could find themselves in the middle of controversial practices and suffer a regression in accepted advances in this area. Without the focus on tailored medical education to the individual learner and the establishment of mental skill development training, AMEDD personnel will continue to experience course attrition from essential medical specialties and experience delays through reclassification processes.

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Enhancement of Human Health and Performance - MAJ Robert Carter

Genetic or other biomedical modalities of human enhancement and its related fields have inspired an extremely controversial scientific debate for over 60 years. Advances in human performance and human-machine (i.e., avatars, robotics) interface will change how we exist in the next 30 years. How will these changes impact our abilities to survive emerging infectious and chronic diseases, climatic /weather extremes, normal aging processes, mental health crisis, life threatening injuries, or solar/cosmic radiation?

Forecasts for Enhancement of Human Performance In 2039

1) "**The race for biomedical and genetic enhancement will-in the twenty-first century-be what the space race was in the previous century".** Humanity is ready to pursue biomedical and genetic enhancement, says UCLA professor Gregory Stock, the money is already being invested, but, he says, "We'll also fret about these things-because we're human, and it's what we do."

    a) Human physical and cognitive (mental) performance is multi-factorial and determined by a range of environmental/situational (physical training, nutrition, clothing, and technological aids) and genetic factors. In the future, exploiting these intrinsic and extrinsic factors will lead to enhancement of physical and cognitive performance.

    b) In 2039, Soldiers will be provided NanO-geneTecK (NOTK) survival kits weighing less than one pound. NOTK kits will contain nano-foods with the capacity to supply +4000 calories per day. NOTK foods will contain high energy peptides and contain stealth nano-particles contained with essential vitamins and minerals and which will be released in response to stress and will help to maintain physiological homeostasis.

    c) A new line of high-tech fabric will allow Soldiers jump higher and run farther than ever before, and assist Soldiers in defeating adversaries. Clothing and exoskeleton technology will be greatly enhanced by new materials, such as carbon nanotubes, transparent alumina (3x stronger than steel and transparent), metal foam, and Aerogel ("frozen smoke", 99.8 % air, highly durable). These uniforms will provide the ultimate "preventive medicine" against combat related injuries. The weight / comfort of new clothing will reduce physiological strain in the future with enhanced protection and load carriage capacity, so less skeletal muscle injuries.

2) **The genetic revolution will lead to great advances into the mechanisms of human fatigue and cognitive degradation associated with human performance.** Clinics will have the capacity to examine Soldiers and determine necessary genetic modifications needed for optimal or enhanced human performance for a specific mission. We will witness genetic disruptive technologies for enhanced human performance (see disruptive technologies) and disease and injury prevention. Genetic engineering clinics will be equipped with, re-growing severed limbs, giving back or enhancement of eye sight, and hearing to the deaf.

3) *Disruptive Technologies improves life spans and postpones disabling conditions from "diseases" and "wear and tear".* "Somewhere on planet earth lives a young child who will be the first person to live…forever." The DaVinci Institute.

   a) Current theories which suggest that the biology of organisms follows a programmed development plan will be disproved. So called "error theories" which are related to environmental assaults (i.e., exposure to battlefield, gulf war syndrome, asbestos) and likely reduce life spans and play a role in the aging process will be decoded with advances in immunological and endocrine systems.

   b) Combat and military training exercises will have less "wear and tear" on Soldiers' mind and physical body.

4) **We will be able to turn on/off genes (proteins) to improve survivability and repair any damaged tissue.**

   a) In the future (2020 and beyond), we will be able to deploy Soldiers to extreme environments (hot, cold, chemical) and remain confident that if they are exposed to any radioactive or chemical material or incur heat stroke or cold weather injuries, most physical damages that might occur can be repaired.

   b) Now everything a Soldier does, smoking, excessive environmental heat exposure, being exposed to "potential radioactive and chemicals" can affect their gene expression and that of future generations. By manipulating epigenetic marks, cells can be transformed into other cell types without changing their DNA. It is simply a question of adding or removing the chemical tags involved.

5) **Avatars will serve in patient assistance (i.e., bed side, meds), training of medical staff, etc. In addition, the same smart, active technology that will be used in building the new generation of avatars could also be integrated into the next generation of prosthetics.**

   a) The current technology for creating computerized avatars for human interactions is relatively primitive; we tend to be surprised if a computerized representation can perform even vaguely human behaviors. In the future as computer programmers and engineers respond to the demand for more realistic human behavior in avatars, we will create innovative technology to manipulate human trust via the results.

   b) Prosthetics would be able to better mimic human movement behaviors and will allow for improved adaptability of patients to smart, predictive prosthetics. If a patient is too sick or busy to visit doctor, their personal avatar will be able to "sit in" for real patient. It will be awesome to be two places at once for a change. Treatment avatars will contain billions of case reports and medical data and will have the ability to assist the physician with a medical course of action or make one on its own.

Implications/Recommendations for AMEDD

- The implications for the AMEDD are revolutionary given that medicine will change from a treatment of disease model to one of a preventive and human health enhancement model.

- Major advances in human biology, material science, and human behavior integration into machines will have great impacts on military medicine and performance enhancement.

- In the future, we will be able to make our Soldiers more resist (i.e., human enhancement) to biological, environmental, or chemical insult by using gene therapy/modification and disruptive technologies that take advantage of our immune and endocrine systems.

- The new clinics (genetic, regenerative medicine) will play a major role in health care systems of the future.

- Personal avatars will be what the blackberry is for the health care provider (HCP) today. Personal avatars linked to electronic health records will allow for rapid, cost effective medical diagnosis by the HCP.

- Technology will allow it to occur and the growing population disease burden will force it to be rapidly implemented.

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Nanotechnology, Biotechnology, and Robotics for Far Forward Diagnosis and Treatment of Casualties in Future Warfare – Dr. Cynthia Abbott

Emerging developments integrating nanotechnology, biotechnology, and robotics can revolutionize far forward diagnosis and treatment of casualties in future warfare, extending the "Golden Hour" of casualty survival. Integration of nano-bio-robo technology should address rapid resuscitation and enhanced recuperation starting with 1) field diagnostics, 2) treatment and biological systems delivery of drugs and reparative agents, and 3) monitoring of combatant physiological responses to chem-bio environmental threats.

*Nano-Bio-Robo Field Diagnostics Forecast:

Hostile environment body scans with wireless transmission and full spectrum uploaded body fluid assay will be far forward.

Internal diagnostic imaging progressed from clothing and equipment sensors at the turn of the 21st century to internal diagnostics using a nano-scale camera swallowed as a pill (Hickey, Camera in a pill offers cheaper, easier window on your insides 2008) in 2015. In vitro nano images hold promise for replacing endoscopes with thick lines of fiber optics (Hickey, Camera in a pill offers cheaper, easier window on your insides 2008) and performing multiple exploratory surgical procedures to discover 'bleeders". Far forward application of internal wireless fiber optics will prevent casualties from receiving multiple exploratory surgeries across the evacuation chain, as experienced in OEF and OIF campaigns. Wireless internal nano-images will be wirelessly uploaded in vitro in 2015-2020 for virtual interpretation to derive recommended treatment. Bionic eyes worn as one contact lens with imprinted electronic circuits and lights plus zoom-in functionality to distant locations (Hickey, Bionic eyes: Contact lenses with circuits, lights a possible platform for superhuman vision 2008) show external body scan potential leading to future bio-imaging capability (Faber 2008). Additionally, ultrasonic bionic ears, functional near-infrared spectroscopy, and EEG nanoscale imaging techniques (Chu 2009, Faber 2008) show promise for nano-scale developments of hand held scanners. Nano scale imaging holds potential for hostile environment body scanning and imaging by supermedics or robots and show technological links consistent with a remote military mobile force in a self-contained medical footprint scenario. Lab-on-a-stick technology derived from advances in proteomics and small molecular analysis currently applies micro fluidic body fluid analysis of serum, plasma urine, and saliva delivering chemical and biological micro arrayed assays on a chip based platform (Srinivasan, Pamula and Richard 2004). Lab-on-a-stick will be used to diagnose infectious diseases, deliver microRNA profiling, perform blood typing (Lab-on-a-Chip 2009), monitor military and indigenous population health similar to astronaut health monitoring by NASA (Marshall Space Flight Center 2004), and an exploding number of applications with robust, reliable analysis (Yarris 2007). Implantable sensors (Levine 2009) inserted before injury hold promise in performing continuous monitoring of body fluids such as sweat, tears and blood biomarkers to detect individual injuries such as trauma, shock, brain injury and fatigue (Levine 2009). Advanced diagnostics and sensors coupled with artificial intelligence and medic-in-the-loop interfaces will create real time therapeutics before traditional clinical signs and symptoms present.

Nano-Bio-Robo Treatment and Biological Systems Delivery of Therapeutic Agents

* Nanobots identify microfluidic changes using biomarkers at the injury site of the casualty.
* Nanobots identify in vivo (internal) bleeding in battlespace.
***Nanobots and biobots deliver nano payloads of therapeutics in battlespace.**
***Biobots detect chemical and biological virus and bacteria threats in a hostile environment and Nanobots upload physiological findings.**

A variety of nanoparticles and nanoshells can target an in vitro problem in body systems and deliver precise treatment specifically to the problem area without collateral tissue damage. (Heath 2009). Currently, nanoparticles deliver therapeutic molecules such as chemotherapy drugs directly to tumor cells and minimize the damage to healthy cells at the desired time and location (Heath 2009). Many nanoparticles connect with antibodies to target specific proteins and minimize the particle's interaction with healthy tissue (Heath 2009). Nanobot and biobot delivery of therapeutics dramatically reduce the amount of drugs needed to treat in vivo problems (Heath 2009). Micro fluidic systems load biomolecules and therapeutics into many chambers to deliver an optimal drug combination at the point of disease (Heath 2009) or internal injury.

Nanoparticle sizes in the 10-100nm range travel to targeted tissue without escaping to healthy tissue through blood vessel walls and new nanoparticles remain therapeutic for more than 40 hours (Heath 2009). Nanoshells composed of silica nanospheres, occasionally covered in a thin layer of gold, also serve as a therapeutic molecule. When sufficient numbers of nanospheres locate to one site heat or scattered light can be delivered to damaged tissues (Heath 2009).

In 2020-2025, nanoparticles and nanoshells will be able to detect injured blood vessel walls and apply chemical, light or heat to tissue walls much like surgeons cauterize bleeding blood vessels in surgery. Additionally, vascular glue applied in surgery to patients in the near future (Trulove 2004) is an appropriate therapeutic payload for nanoparticles or nanoshell delivery to combat internal bleeding of casualties in 2020. In 2010, blast injuries of casualties resulted in blunt trauma and internal 'slow bleeders'. Auto-injecting or inhaling nanoparticles and nanoshells carried by the supermedic, delivered by a robot, or implanted in the military member a priori hold promise for decreasing the number of exploratory surgical procedures performed in OIF and OEF to 'rule-out' slow bleeders.

Currently, wound healing advances include silver nanoparticles and growth factors. Silver nanoparticles decrease inflammation in wound healing and burn injury, decrease the cost of therapeutic silver with target payload release at the tissue level, and decrease inpatient hospital length of stay by achieving faster wound healing (Nanowerk News 2007). Currently, nanoparticle aggregates are released into the wound and body for longer than 30 days accelerating wound healing by directly releasing growth factors (Nanotechnology wound care 2007). Similarly, once foreign viruses and bacteria used in chemical and biological warfare are identified, nanoparticles and nanoshells will be able to activate antigens and deliver therapeutic molecules such as the QS-21A to help the body fight disease and improve the body's immune response to threats by enhancing growth factor activity (Kloeppel 2005).

Currently the U.S. Army's Telemedicine and Advanced Technology Center (TATRC) promotes development of a snakelike robotic arm within the Army's high-tech stretcher a component

associated with the Life Support for Trauma and Transport (LSTAT) system (Chu 2009). This highly articulated robotic arm with snakelike flexibility operates via a joystick with mounted camera producing pictures of a body on a laptop, physiological sensors detecting O2 and CO2 to detect breath and deliver oxygen without the help of a medic. In the future, adding ultrasound and an ultrasound probe will allow body scans to detect internal bleeding (Chu 2009).

Military Resuscitative Care 2020-2039

In 2025-2039 supermedics will remotely control a variety of RoboMedics (medical robots) or will assist supermedics to deliver initial emergency medical diagnostics, interpretation of results, initiate initial treatment, and manage biological or chemical assaults in hostile environments. Robomedics will assist supermedics in initial treatment to casualties when evacuation teams are unable to access casualties in sustained hostilities, inaccessible terrain and challenged air evacuation conditions.

Currently, DARPA funding supports development of a large mobile Trauma Pod to deliver resuscitative interventions in a combat zone before transport to a medical treatment facility (Baker 2005). Smaller medical robots capable of delivering basic emergency care to sustain life by highly mobile unmanned vehicles will augment survivability of blast, penetrating, blunt, chemical and biological casualties. Supermedics will use robomedics with different functionality for initial diagnosis and treatment of mass numbers of multi-trauma casualties.

A variety of RoboMedics with different functionalities will initiate onsite diagnosis and treatment before evacuating the hostile area. Examples of diagnostic robomedic functions include delivering, measuring, and monitoring O2, monitoring exhaled Co2, using casualty blood to upload field lab-on-chip fluid values, and perform full body scans. Treatment robomedic functions will include cleaning a 'dirty wound' using spray and biobots to decrease wound bioburden, applying shape-retentive wound dressing in situ, activating exoskeletons to stabilize fractures, and delivering antibiotic and pain medications similar to the team concept of prehospital treatment.

Alternative Futures

Remote bone alignment controlled from a remote location for open extremity fractures will be delivered at the point of injury by Robomedics. Robomedics will either activate absorbable therapeutic osteo glue payloads implanted in service members to stabilize broken bone or deliver Nanobots with osteo glue payloads (Heiss 2004).

Unmanned air vehicles will have the potential to administer hydrogen sulfide to casualties awaiting treatment. Hydrogen sulfide suspends metabolism in animal model research without tissue injury (Keim 2008). Reversible metabolic hibernation decreases energy requirements, body temperature, and metabolic rate (Keim 2008). Achieving a reversible metabolic hibernation without tissue damage will be the on-demand treatment delivered (Mittlestadt 2007) to casualties until extraction and transport to trauma medical center is complete.

Recommendations

Military medicine must collaborate with industry, academe, national science foundations and federal laboratories to adapt and integrate into strategic planning nano-bio-robo technologies for use in far forward resuscitation. The University of California Berkeley, University of Washington, Seattle, Massachusetts Institute of Technology, DARPA, National Science Foundation, NASA, National Science Foundation, and the National Institutes of Health are working with industry to produce relevant nano-bio-cogno science capabilities for health care. Delivery of small robotic delivered nano-bio technologies to assist the supermedic or controlled by the supermedic offer greater flexibility for implementation and development than vehicle based mobile intensive care units.

The AMEDD must sustain and integrate a Futures Cell similar to the US Army Training and Doctrine Command model with a programmed budget line to continuously facilitate futurist thinking and determine relevancy of AMEDD futurist investments and outcomes in the context of the U.S. Army.

Suggested priorities for development include:

* robotic arm delivers autoinjectables for therapeutics (infection, pain, biomarkers, etc.,)

*robotic arm cleans wounds with spray, ultraviolet light, etc., apply in situ dressings

* robotic arm with camera, infrared optics for night scanning with ultra sound, then x-ray

* lab-in-the-field chip for expedient fluid and physiological functions monitoring

* robotic arm applies blood to lab-in-the-field chips

* robotic self-sustaining energy sources

*wireless transmission of images, physiological values, etc. for interpretation and validation recommended treatment remote location

If bionic eyes worn as contact lenses can be used to display maps, bionic eye cameras can upload physical assessment images to remote locations and download treatment screens to coach supermedics and robomedics in diverse onsite treatment of burn, blast, blunt and penetrating injuries and chem-bio assaults._Robomedics will augment supermedics and offer virtual treatment delivery when casualties are inaccessible. Functionality of multiple small robots should be available to augment far forward resuscitation in hostile military scenarios and natural disaster emergencies (i.e., earthquakes).

The robotic arm should assist the supermedic in diagnosis and treatment. Secondly, the robotic arm should be capable of attaching to a casualty litter or body armor until functionality is available by unmanned vehicles. Unmanned vehicles will initially use a GPS device to locate, assess and treat the casualty autonomously when necessary or as an adjunct to a far forward trauma system.

Converging nano-bio-robo technology advances will propel the supermedic of one to a supermedic of many when the robomedic can be delivered as an assistant to the onsite supermedic or remotely controlled in virtual emergency treatment.

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Patient Transport in 2039 - LeRoy A. Marklund, MAJ, AN

Profound technological developments have created a revolution in both aviation and medical care. In order to keep up with ever changing advanced technology, the AMEDD must offer futuristic medical training now. It is possible that U.S. Army nurses will be our future fixed and rotor wing crew members. It is feasible that rotor wing aircraft as we know it will not be recognizable by the year 2039. Soldiers on the battlefield will be wearing medical sensors that send out distress signals if injury or sickness occurs. Flight crews will respond rapidly and render advance medical care while in flight. All of this will be with state of the art medical and aviation technology.

Forecasts:

1. Aeromedical evacuation is vital for positive patient outcomes.
2. Where ever soldiers are injured a robust aeromedical evacuation system must be available.
3. U.S. Army nurses utilized as flight crew team members on fixed and rotary wing platforms.
4. Self contained multiple medical device battlefield stretchers.
5. Rapid transport of critically injured soldiers from battlefield to hospital in where in the world.
6. Jet propulsion MEDEVAC aircraft with both vertical & horizontal lift capabilities.
7. Mobile patient wireless monitoring systems that are light weight and smaller than a cell phone.
8. Patient diagnostic capabilities while in flight.

Examples of Major Accomplishments:

1. In-flight casualty care course, Fort Rucker, Alabama.
2. U.S. Army Trauma Training Center, Miami, Florida.
3. Life Support for Trauma and Transport (LSTAT) medical system.
4. MV-22; collaboration in the design for patient transport.
5. Personal digital assistant (PDA) and patient sensor technology.
6. Robotic medical technology.

Implications and Recommendations for AMEDD:

1. Offer flight nurse course for U.S. Army nurses.
2. Develop in-flight diagnostic test (computed tomography scan, x-ray, and serum laboratory tests).
3. Initiate virtual medical technology for in-flight patient care.
4. Develop aircraft engines with "self energy sources."
5. Improve LSTAT so that it is light weight, self-contained, and has built-in power source.
6. Robotic and hardened battlefield ambulance.

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Future Organization/Structure for Military Medical Research to Insure Flexibility, Responsiveness – LTC Andrea Stahl

The United States Army Medical Department (AMEDD) has historically provided technological and scientific solutions to unique problems created by warfare. Examples of significant new technologies or medical advances are abundant, and range from the development of potent insecticides and therapeutics to prevent and treat disease non-battle injuries (DNBI) like malaria and yellow fever, to the establishment of sophisticated mechanisms of transmitting medical information such as telemedicine (Ginn). The recent conflicts in Afghanistan and Iraq have created new medical challenges that clearly illustrate the necessity of a rapid and relevant response by the military science and technology community to the needs of the Soldier on the battlefield.

Although traumatic injuries and events that result in permanent disability (i.e.: TBI, PTSD, amputations, wound infection) have always threatened Soldiers on the battlefield, our ability to medically respond to such injuries is constantly evolving. The current conflict in Iraq and Afghanistan has created pressure to improve treatment options and explore scientific and technological mechanisms to reduce or eliminate the consequences of battlefield injury. Our Soldiers and the American people expect rapid response to these problems and it is the responsibility of the science and technology community to provide solutions. Medical issues such as wound infection and traumatic brain injury demand immediate attention in the research arena and military research must be ready to "lift and shift" resource fire to address relevant medical problems. An excellent example of responsiveness is in the development of prosthesis for amputees. The number of soldiers requiring this type of medical intervention triggered an increase in the research dedicated to improving the current technology (Pope). As we move closer to 2039, other medical challenges will emerge that will demand similar rapid and effective research initiatives and ultimately, solutions. As the AMEDD plans for the future, it must ensure that the scientific and technological (S&T) infrastructure is created to be responsive to the needs of the warfighter. Arguably, in futures planning, the specific technological or scientific demands are almost secondary to developing and strengthening our ability to quickly identify and respond to them.

Other research organizations have recognized the necessity of responsiveness to emerging medical issues as well as the bureaucratic and administrative limitations that challenge flexibility and innovation. The National Institutes of Health (NIH) recently established a panel to explore mechanisms for improving the ability of the institutes to respond to relevant health issues facing the American population. Recommendations for improvement included *dedicated funding*, the *recruitment of outstanding leadership*, and the *commitment to individual scientists as the main sources of new discoveries* (NIH executive summary).

While not all of the guidance given to the NIH is applicable or desirable for the Army, there are sufficient parallels between the organizations such that many of the panel's recommendations can provide direction for the AMEDD, and many options exist to ensure the future flexibility, relevance, and responsiveness of the Army S&T community. Factors such as dedicated funding and a *resolute emphasis on the quality of scientific research* were recognized as vital to the success of the NIH, and the AMEDD science and technology groups must embrace a similar commitment if we are to continue to remain ready and relevant to the warfighter.

An important question, then, is what do the Army laboratories of 2039 look like? By leveraging the lessons learned from the NIH report, three important factors become critical for success. The three factors identified as important for success in the NIH report can serve as a roadmap for successful Army laboratories. *Strong leadership, consistent and adequate funding, and talented researchers* are the key elements to responsive, dynamic, and productive laboratories for the future and successful laboratories are essential if we are to meet the health challenges of 2039.

Ideally, in 2039, Army laboratories are staffed with the best and the brightest scientific minds. Work on important basic research and applied research draws enthusiastic, creative individuals whose ideas and proposals can be supported with funding and other resources. Laboratory commanders are provided with direct funding to ensure that they can recruit and retain inventive, talented scientists from across the country. Changes in federal employment laws have created positions that reward performance and encourage accomplishment. These changes provide increased flexibility for managers to modify skill sets and avoid personnel stagnation.

Military scientists serve as leaders for Army laboratories and are highly trained officers who have first-hand knowledge of the relevant health issues faced by the warfighter.

The successful laboratories of 2039 have solved the problem of having to use research dollars within a certain timeframe. This has eliminated waste and allowed for better planning and execution of funding. Laboratory commanders are able to quickly respond to Soldier's health issues by creating special programs to address areas of concern. Discretionary funding is provided to laboratory commanders so that they may be responsive to the needs of the warfigher and develop research programs that address newly emerging needs. Many programs are still funded at the DoD level, but this represents only a portion of the work that is conducted.

Health issues that face Soldiers will parallel the health issues of the general public and so Army laboratories have close collaborative relationships with other federally funded labs (i.e.: NIH) so that little duplication of research occurs, but information sharing is maximized and fruitful complementary efforts are nurtured.

Communication between combatant commanders and scientific officers has increased and there is a better understanding of how the scientific community can assist and provide solutions to the warfigher. In turn, the scientific community better appreciates the daily struggles of the Soldier and can more ably identify areas of concern and how to apply scientific and medical solutions to those areas.

Communication with the medical community and the scientific community has also increased. Problems seen in military hospitals are rapidly communicated to the military scientific community and laboratory commanders are able to develop research plans to address these concerns. These solutions can result in basic research efforts or applied efforts. Research and fellowship opportunities in the MRMC community are encouraged for all Army physicians and serve to strengthen ties between the clinical and scientific arenas.

Intellectual property issues, long a stumbling block to the development of successful research collaborations and endeavors, have been standardized throughout the world. Europe, Asia, and the United States have agreed upon the legal process governing intellectual property.

The Food and Drug Administration, facing enormous public pressure from uncontrolled, escalating health costs has been forced to review its bureaucratic and archaic guidelines for drug and medical product approval. The "Animal Rule" is finally understood and medical research laboratories are able to plan and develop animal models to support their therapeutic products.

This vision, of a productive Army laboratory system that is free of many of the burdens faced by our laboratories today, will not be easy to attain. Barriers to an industrious and dynamic laboratory system must be addressed for us to maximize our research abilities and be ready to support the warfighter, and the next step in futures planning must involve developing the roadmap to bring us to a productive 2039.

Unfortunately, the current funding structure faced by many Army research laboratories limits the flexibility of research institute commanders to respond to the needs of the warfighter and to adequately prepare for the future. For example, programmatic decisions for many MRMC laboratories are made at the DoD level, precluding the ability of the MRMC Commander and laboratory commanders from responding to new and relevant threats. In order to address these problems, some type of discretionary funding should be provided to laboratory commanders to allow them to quickly develop and maintain programs that are needed by the Army.

The ability to recruit and retain talented scientists and subject matter experts is a significant problem faced by laboratory commanders. The need for both military and civilian expertise has been recognized in the past. In his review of the MSC following the first Gulf War, COL(ret) Ginn states "*Expertise remained a key to the corps' future. The MSC and its precursors had contributed to modernizing military medicine, principally by giving the Medical Department access to new technologies. The inclusion of experts in varied technical fields changed doctrine, equipment, and clinical practice, and the presence of scientific expertise….was genuinely a national resource.*" (Ginn, p. 448) As we prepare to face the challenges of 2039, the AMEDD S&T community must remember the lessons of the past and work arduously to maintain scientific expertise. In many laboratories, a large percentage of the scientific staff is close to retirement age. For Army laboratories to remain successful, it is imperative that they maintain a high level of scientific expertise and critical skills in a variety of areas. This is an expensive, but necessary investment and insurance policy in the ability of the S&T community of the future to respond to emerging threats. However, the current system fails to create an infrastructure that promotes this concept. New investigators have little opportunity to establish independent research programs and many subject matter experts lack sufficient research opportunities to support their research interests and efforts. Yet, their expertise is necessary even when the government opts to perform specific scientific projects in the private sector. Again, a measure of discretionary funding provided to laboratory commanders would allow leaders to actively recruit and retain talented scientists and subject matter experts who may struggle for survival under the current system.

The AMEDD must also continue its commitment to the development of talented scientific officers. Opportunities to perform research must be expanded and officers should not be punished (via the promotion system) for performing bench-top research. Many officers are pressured to transition to administrative roles too early in their careers and thereby lose the opportunity to solidify a firm scientific foundation. As identified in the NIH report, strong leadership is a fundamental requirement for a successful scientific organization. The AMEDD must ensure that it provides

junior and senior officers with the appropriate developmental opportunities (while simultaneously maintaining a strong scientific background) to lead world-class research programs.

The ability of the Army as well as the Department of Defense to leverage other public research (i.e.: NIH) must be strengthened. Army laboratories oftentimes have expertise and facilities that exceed those in academia (particularly in the area of biodefense). However, decisions regarding how funding may be dispersed and accepted oftentimes exclude Army investigators from taking advantage of relevant funding opportunities offered by the NIH and other federal agencies. NIH policy, for example, prevents permanent government employees from collecting salary dollars under research grants. However, many of the research laboratories in MRMC must "earn" their own salary dollars thru funded research proposals. The NIH policy represents a significant roadblock in the Army's ability to fund and conduct relevant research. As we move into the future, the AMEDD must explore mechanisms for increased communication with and ways to capitalize on funding opportunities from the NIH and other federally funded research organizations. These opportunities would also strengthen the Army's ability to conduct basic research by providing a funding stream.

Strong ties to the greater Army community are also critical for the scientific community to keep abreast of important medical requirements generated by the warfighter. Communication with combatant commanders, senior NCOs, and other leaders will facilitate the development of relevant scientific programs that focus on Warfighter needs.

Many of the health initiatives identified in Futures Phase I focused on individualized health care, and the possibilities for progress in this area are numerous and exciting. From an increased ability to pre-symptomatically detect disease to personalized "nanobots" that act as miniscule robo-doctors, to dedicated health avatars customized for each Soldier, realistic, attainable innovations exist that would serve to improve our fighting force. In order to reach these admirable goals, however, we must work hard to establish a research structure that can understand and respond to these needs, and ultimately perform the arduous research that will be required for these initiatives to become realities.

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Appendix 5: Professional Staff and Roles (VWG 5) Individual Papers

Impact Of Future Military Mission Changes (Or Non-Changes) On Professionals and Professional Tasks for Military Medicine In 2039 - LTC James Davidson

It is very likely that the next 30 years will have U.S Forces face many challenges and threats covering the entire spectrum of conflict including; regular and irregular wars, relief missions, future sustained engagements in crisis areas for our national interests, as well as support of coalitions. Simply sustaining the health of our force, the Army, is probably not a position that will serve in our best interest. Instead, one could argue that preparing for the future now, will better serve our force by mitigating threats to various degrees. Our goal should be careful consideration of the future, to suggest the attributes of a medical force capable of adjusting with minimum difficulty when the inevitably comes. In addition to adapting and transforming, trends indicate that preparing for Humanitarian missions, Support of other Countries, Warrior Transition Care, and Joint Medicine may become, and remain, main focuses of Army medicine.

If we can accept the above as possible future missions of Army Medicine, operating in a much more joint structure, we should start to look at the how these missions may impact professionals and professional tasks for military medicine.

Humanitarian:

Tsunamis, typhoons, hurricanes, tornadoes, earthquakes and other natural catastrophes have been and will continue to be a concern of commanders. Thus, these catastrophes will to a large degree have an impact on Army medicine. In the 2030s as in the past, the ability of U.S. military forces to relieve the victims of natural disasters could help the United States' image around the world. For example, the contribution of U.S. and partner forces to relieving the distress caused by the catastrophic Pacific tsunami of December 2006 reversed the perceptions of America held by many Indonesians. Perhaps no other mission performed by the Joint Force provides so much benefit to the interests of the United States at so little cost.(1) Note also that this type of mission combines the possibilities of working in a joint structure and supporting other countries. Beyond being a humanitarian mission, this scenario also infers that the types of skills or tasks needed by the military medical force would consist of understand or having common knowledge of sister services and coalition medical cultures, protocols, capabilities, and procedures. One could also infer that the types of tasks that would be associated with this mission would include a heavy focus on preventative medicine, disease management, environmental sciences, all above and beyond the expected trauma, surgical, and primary care related medicine.

Another fear haunting the public is the appearance of a pathogen, man–made or natural, able to devastate mankind, as the "Black Death" did in the Middle East and Europe in the middle of the fourteenth century. Within barely a year, approximately one–third of Europe's population died. The second-and third-order effects of the pandemic on society, religion, and economics were

devastating. The implications for joint forces of a pandemic as widespread and dangerous as that of 1918 would be profound. American and global medical capabilities would soon find themselves overwhelmed. If the outbreak spread to the United States, the Joint Force might have to conduct relief operations beyond assisting in law-enforcement and maintaining order when legal prerequisites are met, as currently identified by the National Strategy for Pandemic Influenza.(1) It is predicted that the world will add about 60 million people each year reaching a total of around 8 billion by the 2030s. It is also estimated that 95% of the increase will take place in developing countries.(1) By the 2030s, about 5 of that 8 billion people will live in cities. Most of these mega-cities as well as other large cities will lie along the coasts. With the majority of the population living in these dense urban areas and the immediate surroundings, it is unlikely that the military will be able to avoid operations within urban environments. It is therefore a logical conclusion that any natural or man-made catastrophes impacting these urban areas will require the military medical support to be a large part of any future humanitarian missions. Even as joint force commanders confronted an array of missions, they would have to take severe measures to preserve the health of their forces and protect medical personnel and facilities from public panic and dislocations.

Support of Other Countries:

The JOE 2008 (Joint Operating Environment) states that in a globalized world of great nations, the United States may not always have to take the lead in handling the regional troubles that will arise. By the 2030s, every region of the world will likely contain local economic powers or regional organizations capable of leadership. In any case, the United States will often find it prudent to play a cooperative or supporting role in military operations around the world. In most cases the assisting of, or intervention in, failing states will require a cooperative engagement between the United States and regional powers. Again, the skills of a diplomat in working with other people and military organizations from different cultures must be in the tool kit of commanders, staffs, and personnel throughout the Joint Force.(1) Parallel to this, is the ability of military medical professionals to work in support of and assistance to these powers' military medical personnel. One current example of this is the transition that is taking place in Korea. The current U.S. position is to turn over command and control of the "Ground Fighters", to the South Korean Army within the next 5 years. Clearly we have strong ties and strategic national interests with South Korea, and it is doubtful that the U.S. would not commit forces to support our ally.

Warrior Transition Care:

In Secretary Gates' recent statement to the Senate, he stated a principle objective in his decisions regarding the budget request was "to reaffirm our commitment to take care of the all-volunteer force, which, in my view represents America's greatest strategic asset".(2) He later went on to say he wanted to, " recognize the critical and permanent nature of wounded, ill and injured, traumatic brain injury, and psychological health programs",(2) through properly budgeting for them. Although his statement to the Senate was addressing the upcoming budget, the inference could be made that the care for these warriors would last far beyond the budget cycle.

Nearly 15,000 service members are wounded and unable to return to duty. (**3)** Prior to Operation Enduring Freedom and Operation Iraqi Freedom, military medical facilities had not seen this

number of permanently disabled military casualties. Providing care for this increased number of wounded warriors changed the culture of these medical facilities dramatically. By not foreseeing this cultural change, some military treatment facilities underwent embarrassing notoriety by the national press when arrangements such as "medical hold companies" and substandard facilities failed to meet the specific needs of the wounded soldiers. Now, these injured soldiers are assigned to Warrior Transition Units. These units have dedicated leadership, case managers and health care providers who specialize in helping our wounded warriors convalesce. There is a 24/7 toll-free hotline for soldiers and their families to request assistance. A state of the art rehabilitation facility, the Center for Intrepid, opened in San Antonio in January of 2007.(**4**) It is likely that the U.S. commitment for our Wounded Warriors will be a mission that will prove to be enduring in nature and require joint medical forces skilled in procedures to manage the healthcare of these "strategic assets".

Joint Medicine:

Just as the current combat operation environment requires joint missions and cooperation between the military services, medical treatment facilities must do the same. In San Antonio, the creation of the San Antonio Military Medical Center will combine resources at Brooke Army Medical Center and the flagship hospital of the Air Force, Wilford Hall Medical Center. The changes in both Washington, DC and San Antonio are scheduled to be completed by 2011.(**5**) Army medical leaders must recognize the different attitudes and values espoused by the Air Force and Navy. While the provision of medical care is no different, leadership styles, command structure and military courtesies vary between the military services.(**5**) As the METC (Military Education Training Center) in San Antonio grows and matures, we can expect the transition to a joint focused medical force, if even only in training, to diminish the service-specific cultural walls of our Defense Medical Forces.

If Humanitarian Missions, Support of other Countries, Warrior Transition Care, and Joint Medicine become, and remain, focuses of Army missions, we should continue to look at how these missions may impact professionals and professional tasks for military medicine. One could submit that preventative medicine, disease management, rehabilitative care, environmental sciences, all coupled with trauma and surgical care would be tasks associated with future missions.

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Factors and Forces Driving Forecasts of the Size and Structure of the AMEDD - LTC William Todd Echols

Introduction

The fundamental starting point for any military force developer defining force structure requirements is to understand the guidance and expectations in national strategic documents and translate that into capabilities to meet the spectrum of potential missions. The challenge for the AMEDD is that the force development processes primarily are in support of the war fighter. The AMEDD has a larger mission to provide health support to a growing population of family members and retirees, which is in constant competition for resources. We live in a world that is changing at a rate not seen by our current generation of senior leaders with the rate increasing exponentially. Between today and 2039 is not impossible to believe that the AMEDD will redefine itself several times as the landscape of the operating environment and technological innovations shape the composition of our medical force and how we provide health care.

Operational Drivers

In 2039 the "conventional" war machine will not look conventional at all. The US Military is still the most technologically advanced and skilled fighting force in the world. The age of unmanned and autonomous fighting systems has arrived. The Future Combat Force developed in 2020 is now the legacy force. While we will not fully replace the need for boots on the ground, the battlefield will look drastically different and we will have fewer Soldiers, Sailors and Airmen in harm's way. As a result of lessons learned from the conflicts in Iraq and Afghanistan in the first decade of the 21st century, the DoD made significant investments in technology and capabilities to fight in unconventional environments' reducing casualty and injury rates. Soldiers are equipped with smart sensor technology that monitors the environment and vital systems on the Soldier enabling combat controllers' operating at a remote location to obtain optimal performance from personnel engaged in combat. Medical personnel now have immediate access to patient vitals and injury information and are able to link directly into the closest Soldier or Medic and provide real time intervention. This is the actualization of a Net-Centric warfare concept known as "Horizontal Fusion".

The Center for International Development and Conflict Management (CIDCM) reported in 2008 that the magnitude (fatalities) of armed conflict declined the last 20 years, but the number of armed conflicts was at a high point. The CIDCM also reported a steady upward trend for the years 1946-2005 for the percent of countries involved in conflict increased from19% to 25% with no foreseeable change to the slope. In 2039 the military operating environment will be a complex network of state and non state actors creating challenges on multiple continents. The threat of a conventional war will be less likely as migration to mega cities has diluted ethnic and cultural boundaries. Developed and developing nations continue to struggle with the influx and growing number of cultures and religions. Ethnic and religious driven conflicts are double that at the turn of the century and the Developed world must come together in a global cooperation to manage these conflicts and the second and third order effects it is having on the developing nations ability to build infrastructure and provide basic needs. The military of many nations and international agencies will be called upon to participate in operations to maintain the peace and assist with humanitarian

efforts. The continent of Africa becomes the region of focus. A new generation of non-state actors emerges that are highly organized and armed with the capability to cause wide scale damage with access to technology to deliver dirty bombs and biological agents. The non-state actors will use humanitarian crises as a tool for political gain. Medical personnel will be called upon to respond to a wide range of crises created by non-state actors and as a result of over population in under developed areas not capable of supporting the demands placed on it.

Healthcare Industry Drivers

In 2039 sickness prevention is an economical issue not just a healthcare issue. Population growth coupled with the increasing disparities between social and ethnic classes continue to prevail despite the United States investing Trillions into eliminating the number of uninsured and increasing the availability of social and public health programs. The economy has still not seen the growth experienced at the turn of the century and has put enormous pressure on the US Economy. In response communities have banned together leveraging technologies to divert patients out of the health care system in to more home care oriented. The Government has promoted this shift through reimbursement rules that are based on outcomes and utilization rates. Now prevention is a revenue producer. Alternative Medicine area a core component of wellness and prevention programs as herbal and hypnotic therapies, mind and muscle stimulation, and culturally oriented treatments are widely used and practiced. A new work force emerges as family members are able to become certified members of the health care team and eligible to receive payment for taking care of their ailing family members or neighbors. Military Medicine leads the way in implementing prevention as the focus of the US healthcare model. The AMEDD's creation of the Public Health Command in 2009 was the first step to actualizing this new reality. A new wave of health providers will emerge and work alongside the Family Practice physician.

Technology Drivers

In 2039 robotics and telemedicine are transform the healthcare industry and the proliferation of nano technology, virtual reality and broadband wireless change the nature of the doctor-patient relationship. The presence of robots and virtual staff supporting the clinician can be found in the health care facility and home. They will have an ever increasing role in administrative functions such as reception and check-in. Allied health professionals such as pharmacy, radiology, labs, dieticians, and similar technical skills like respiratory therapists and physical therapists are performed by robots and virtual assistants that are able to provide immediate feedback to the patient and health care team able to provide on the spot assessment and instructions or the results will generate automatic orders for medication or follow up treatment based on statistical outcomes data located in a vast electronic healthcare database / medical record designed to provide optimal treatment protocols based on trillions of data points. The ability to connect anywhere at any time has created a network or advance medical treatment hubs that are connected to remote areas. Limited access to specialists in remote geographical locations is a thing of the past. With the emergence of virtual reality, tele-health and robotics, patients will visit their local Mednet facility or log in from their home medical terminal. Ancillary services are readily available and results are immediately transmitted to the electronic medical record and available anywhere in the world. Advances in medical sciences have removed the necessity for physical exams where senses of the human hand detect abnormalities. A

technician and use a set of virtual hands or the provider can use robotic hands to physically exam the patient and the sensors provide data elements that are translated into a diagnosis. There is still a large demand for surgical procedures in populated and remote locations. Robots are now performing or assisting on many medical procedures. Medical, nursing and allied professional schools and training programs have made significant strides re-designing curriculum to account for the invasion of technology in the healthcare environment and are offering courses to adjust patients as new technologies dominate the industry. The Military Health System in 2039 will look vastly different as we become more of a government health system as the MHS, VA, Public Health Service, and Indian Health Service operate as a single system and TRICARE and the Federal Employee Health Benefits Plan merge into one government insurance plan.

Implications to Future AMEDD Force Structure

In 2039 Military Medicine will be a leader on the international landscape. The AMEDD must be flexible to support a range of operations from low level humanitarian operations for full out conventional war. As the balance between conventional operation shift more towards support and stability types of missions, the AMEDD must have the flexibility to quickly shift modes, sometime on the run. The structure in 2009 must be able to support a force deployed in multiple theaters and operate as small independent units. Technology of 2039 will have advance to the point that will enable our medical force to deliver health care in remote locations with modest support requirements. Due to the diversity, complexity and blurring of international, ethnic and cultural boundaries, we must consider the need to further integrate people from foreign countries into our ranks. We must also consider the need to integrate US personnel into the ranks of other countries at a higher density than in 2009. AMEDD Officer will have a cultural/regional area of focus.

Prevention and public health are central theme in our health care delivery and deployment operations. Both currently are overshadowed by their higher paid specialist counter parts. Economic and global health trends swing the pendulum back to prevention in the future. In many ways the AMEDD is well ahead due to its socialistic nature of health care delivery and focus on readiness. Peace and stability in the future are less dependent on deterring larger developed countries and more dependent on the economic and social stability of developing nations. Basic health infrastructure and service availability are key to achieving stability. We no longer can just show up, build medical infrastructure, and deliver medicine to heal a small minority, and pick up and leave once the immediate issues are resolved. The AMEDD must be designed as such that we are able to leverage knowledge and expertise to develop the basics of public health and transfer that knowledge. As the government health and insurance systems merge, military medicine will become less involved in the full scope of health services and not require the number of specialists as in previous years. As technology emerges we are able to pool our resources and reach back into an elaborate network of providers. Trauma will still be a critical skill, but less needed at the front lines as our medics are able to conduct some higher level trauma procedures and technology enables us to stabilize a casualty for evacuation directly to echelon III or IV facilities outside of the theater of operations.

Technology advances have the potential of impacting healthcare like it has impacted the auto industry. As services are automated, so are the jobs that were once performed by humans eliminated. Robotics replaces OR staff or reduces the number of a particular specialty as procedures

are now done remotely, thereby eliminating the need for a provider. There will be an increased demand for support staff with the technical skills to support and sustain all the advances in technology. Medical maintenance staff must also be trained IT specialist and have an understanding of the medical impacts. The OR tech or nurse must be able to service complex medical devices, manage the IT interface, the patient and the surgeon at the same time. The clinical environment becomes less dependent on people as automation is more involved. We must have the business transformation expertise to integrate the new technology into our processes. IT at the strategic level must be able to efficiently acquire and field these new systems in a timely manner and have the flexibility to stay ahead of the accelerated nature of technology to prevent introduction of technology that is outdated by the time it arrives in the MTF.

What size will the AMEDD be in the future? The size of the Army in general will ebb and flow in the years to come depending on the mission demands and the American peoples willingness to commit military forces around the world. The Army will put pressure on the AMEDD to minimize its impact on the total force structure. Technology advances, political forces to reform health care and contain costs, involvement in conventional war will dictate the size. Technology will have an impact on the manpower requirements for clinical/clinical support roles. There will be few hospitals as we know them today as technology enables us to create a few major hubs of specialists that can reach out using tele-health technologies and reducing our foot print requirements at remote locations.

What will the AMEDD structure be in the future? Our identity as a separate medical system will be less obvious. The AMEDD will be known more for its presence in its roles to support conventional conflict and stability type operations. Delivery of peace time health care will require less military providers. The types of providers required will change to prevention and public health oriented, IT and data oriented. The world today is very complex and difficult for any one person to collect process and make decisions using all data available. The world will be dependent on networks of information exchange with the ability to routinely integrate new processes and technologies in a synergistic way. Military medicine must have the structural flexibility to operate in this complex and technologically driven environment and function as a learning organization.

Risks: The United States must invest in training the future generation in science and technology focused fields of study. Current trends place the US behind many other nations who have already made training and education for a technological future a priority. The military could suffer from a shrinking pool of capable personnel to meet future requirements. Over reliance on technology also comes with the risk of operational in effectiveness if the technological infrastructure is damaged. A balance must be maintained between the high tech and low tech. The military system must be able to maintain pace with the private sector, failure to do so will result in a loss in confidence in our ability to meet the war and peace time missions.

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Factors and Forces Driving Recruiting and Retention for Military Medicine In 2039 - LTC Tracy Werfele

New Style of Battle and a New Type of Recruit

In 2039 we are not fighting battles on the ground as we had done so many centuries before. The thought of sending in Agents for hand to hand combat is unheard of in the civilized world. The term Agent is a universal name for all previous Soldiers, Sailors, Airmen, and the like names that were used 30 years ago to describe persons responsible for the defense of the United States. The recruitment of Agents is a very tedious task that begins as early as conception and as late as middle school. The road to being a part of America's premier force of intellectually ready and strategically gifted requires careful screening and early educational preparation during the critical learning years.

Magnet Status Forces

During the earlier part of the 21 century many hospitals worked hard recruiting the best of the best and implementing best practices in an effort to attain "Magnet Status": A status that set one facility apart from another in reference to its elite nature and delivery of the best quality healthcare. As facilities evolved to super status and superior levels of perfection, so have the recruits that we select for the U. S Medical Alliance. Though applicants are still allowed to apply during their formative years, only on a case by case basis are recruits considered after the age of 15. Parents are flocking to recruiting stations because of the education benefits that begin early on, as well as the benefits to the entire extended family as a result of the potential recruit's service. Service in the U.S Medical Alliance is a sure stepping stone to top corporation positions and political office. Current legislation requires that all politicians have served in the U.S Alliance, (either in a Medical or Strategic billet). All Recruits must have at minimum a dual Bachelors degree: one in strategic science and the other in a medical specialty.

Delineating the Best of the Best

Recruits that have completed the necessary requirement as of 2039 are assigned based on multiple factors. The Alliance realizes that no all personalities are able to work together in such a fashion that maximal decision making and skill application are achieved. Thus, the Alliance performs genetic testing and personality testing to ensure compatible genotypes and psychological thought processes are assigned to the same cells. It ensures a good mix of intellect that when brought together is the catalyst of superior outcomes, satisfaction, and quality care and practice.

A Workforce Responsive to Mission

There has always been a critical nursing shortage in hospitals throughout the history of nursing. Since 98% of all chronic diseases were eliminated and facilities are fully utilizing Web-medicine, the

need for nurses on the inpatient side has dwindled drastically. In the past 40 years average hospital census for Alliance facilities with an average of 250 beds was 125. The average census in 2039 for an Alliance facility is 30. The drastic decline is due to modern technologies in health care and the absence of disease as we knew it 40 years ago. The nursing shortage is no gone though. With new technology to improve health and wellness, subsequently people are living longer. The average life expectancy has jumped from 75 in 2009 to 92 today. Long term care facilities are overwhelmed with the number of clients requesting to be admitted. The family dynamics of today unlike 40 years ago does not support caring for aging parents. The middle age crisis during the early part of the 21st century where individuals were faced with the care of their aging parents has been pushed to long term care. In response to the needs of the beneficiary population, the U.S Medical Alliance has 38 long term care facilities nationwide. Of the nurses that we recruit, 77% are sent to long term care facilities. Those nurses that are chosen to remain in hospitals are carefully screened for these positions. Inpatient nurses are involved in ongoing research to produce evidence-based practice and only the most intellectual recruits (in essence the "cream of the crop") are accepted.

Retention Incentives

Parents who apply bear all expenses until the recruit completes all requirements. Upon entry the family receives a monthly stipend, in addition to the recruit's pay. Recruit pay is calculated in 2039 based on their level of expertise and special qualities. Pay is always set higher that the civilian sector to avoid competition. The family stipend ends upon the recruit's departure. Family stipends are based on the nation average family income. If the recruit retires after 15 years, the family continues to get the stipend until their demise. The "family" is the primary adult(s) that are responsible for the recruit until he/she reaches the age of 16. Recruits retiring after 15 years are given their full pay for life. Recruits may not stay past 15 years as this does not allow for diversity and change.

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Technology and How It Will Change Education / Training and Make Many Professional Tasks Obsolete For Military Medicine in 2039 - MAJ Shawn Gelzaines

Introduction

There will be many technological influences that will impact the Army Medical Department (AMEDD) of 2039. These new technologies will change the AMEDD workforce, and the entire Army, by making the individual Soldier free from disease, quick to recover from injuries, and years older than the Soldier of today. New technological advances in virtual reality and methods of learning will allow the AMEDD of 2039 to increase the individuals speed and capacity to learn. Additionally, advances in information management, communication, and virtual systems will increase the accessibility and realism of training. In the end these future technologies will change what the AMEDD needs to instruct, how they will instruct, and how Soldiers will learn.

Technology Changes That the AMEDD Will Need To Provide Education / Training

The development of new technologies that will be available in healthcare will transform the areas that will require training in the AMEDD. The increasing maturity of newer technologies such as Robo-Surgery, Embryonic Stem Cells, advances in telemedicine and communication devices, and the increasing focus on predictive medicine will be incorporated into the future AMEDD.

By 2039, robotic surgery becomes the primary means for surgeons to conduct invasive procedures on patients. Although surgeons learn both manual and robotic surgery during medical school, the manual method of surgery has become outdated and obsolete by 2039 and is rarely used in actual practice. The military, and the civilian sector, has embraced robotic surgery systems. Robo-surgery systems used within the AMEDD garrison healthcare activities are identical to the civilian models. In military field environments, the AMEDD utilizes military specialized robo-surgery systems which have greatly reduced the patients' recovery time, allowing the patient a quicker return to duty.

Once surgeons enter the AMEDD of 2039, surgeons are taught the use of military robo-surgery systems. Some of these military systems are telerobotic (Robotics, 2007) systems that allow surgeons to guide procedures from a distant location on battlefield injuries. Robotic surgery equipment is even utilized to perform procedures on individuals that are in the process of being evacuated. The AMEDD Center and School by 2039 has become one of the world premier instructors on robo-surgery systems for on and off the battlefield.

The use of embryonic stem cells has become a routine method to treat patients that have lost a limb, appendage, or organ. Because of the high quantity of battlefield injuries that resulted in the loss of a limb or appendage, the Army medical community has been in the lead of embracing the research and development of embryonic stem cells research and development. The Army Medical Department by 2039 leads the Department of Defense (DOD) training in harvesting human tissue samples and maintaining them in storage for all personnel entering the U.S. military system.

Advances in communications and automation devices by 2039 will require specific instructions on how to utilize the new systems that are incorporated into the AMEDD. Enhancements in communication devices and holographic technologies will allow care providers to be "virtually present" in distant healthcare procedures. New automation systems such as electronic health records, and medical administrative support systems will require the AMEDD to provide instructions on their use. Additionally, new patient utilized healthcare systems, that allow the patient to track their personnel wellness and care while interacting with a virtual healthcare consultant will require the AMEDD the develop training for all Soldiers entering the Army.

The use of genetic and proteomic data in Soldier preventative care will be used to counsel Soldiers when they entire the military and during their care. Based on the early review of Soldiers genetic and proteomic data, care providers will be able to initiate corrective treatment measures that will prevent Soldiers from facing future diseases, making the U.S. Army disease free and the healthiest military force in the world.

Soldiers in the Army of 2039 will benefit from the maturity of nanomedicine technologies. Soldiers receiving injuries will receive nano-medical treatments that will allow their cells to be repair. Nano technology devices will treat Soldiers receiving infections, were the physician and Soldier will be able to watch on an enlarged digital display as the nano devices immediately go to work on clearing the infected area. Nano devices will allow specific point drug delivery, increasing the effectiveness of drug treatments and reducing the dosage amount to the individual. This increases the effectiveness of drug treatments, as physicians can monitor the nano drug dosage and witness it in action through nano imaging systems.

Future Training Methods

All of the above new technologies will require training in the 2039 AMEDD. And the methods for training personnel will have changed due to the new training methods that technology has now made available. Lengthy class room environments and courses will have decreased by this time as the AMEDD utilizes more distant classroom environments to train by video simulation, 3-D classrooms, and virtual reality training. Additionally, the use of neurotechnology will have increased the speed and amount of materiel individual persons are able to learn, making the Army capable of creating "superstudents".

Playable software simulators will be used to instruct medical personnel on handling different types of events. Medical professionals will now be able to practice on different simulations that can handle battlefield and civilian casualty events. The use of health care video simulations will allow the AMEDD to train personnel faster and more effectively (Tucker, 2008). Simulations will be able to handle multiple students on-line handling all sorts of medical scenarios, and observe how the students interact, and what medical care they provide. Evaluators will be able to observe and comment during the simulation training from other distant locations. By 2039, healthcare workers will be allowed to train and be evaluated wherever they might be, reducing the amount of travel between distant classrooms (Tucker, 2008).

Prospective students would be able to avoid traveling to courses and instruction through the use of distance 3-D classrooms and virtual reality. Instructors and students will be able to create a virtual classroom from their home and work. Virtual classrooms will allow all the benefits and interactions that previous on-site classrooms had fulfilled.

Technology Changes and Impacts in the Workforce

The different technologies that will be available in the 2039 AMEDD will impact the Army workforce. Technologies that will have major impacts on the military workforce in 2039 will be through the use of robots, biogerontology, embryonic stem cells, and artificial intelligence. Through the use of these technologies personnel will be able to perform more functions from a distance. Additionally, these technologies will increase the health and service life of the individual Soldier, reducing the amount of new Soldiers the Army is required to bring into the organization each year.

The use of robots and robotic surgery will impact Army healthcare personnel. Surgeons will be able to conduct surgical procedures with robot assistance from a distance, and will no longer be required to be on-site for invasive procedures. Robots will replace some personnel that used to be needed in the operating room. Robo-surgeries will be conducted on in motion evacuation platforms, allowing personnel to be taken from their point of injury and receive immediate surgical assistance. Robotic surgery will also decrease the amount of time a person will require to recover from surgical procedures (Robotics, 2007) making them available for duty faster than current medical procedures.

Biogerontechnology will allow improvements in the aging of people and an increase in the life span of the individual and the workforce (Evans, Ralston, and Broderick, 2009). The military will be able to maintain increasing older personnel within their ranks. As an individual's retirement age increases, so will the minimum years required to retire in uniform. Additionally, the standard in uniform retirement will change from 20 years in service to 30 years in service, with an individual serving their last 10 years in restricted to deploy assignments within the institutional Army. Now that older personnel are having longer careers within the Army, the amount of new personnel required annually to fully staff the force will also reduced.
The use of embryonic stem cells treatments will allow Soldiers to be brought back to 100% after injuries. Soldiers will be able to heal faster from stem cell treatments. Additionally, previous wounds that resulted in a loss of a limb or mobility and possible physical retirement of the Soldier from the Army will be reduced as embryonic stem cell treatment will allow new limbs to grow (Science, 2009). This will drastically change the way orthopedic surgery and physical therapy is conducted. The Army will be able to heal Soldiers faster and retain them longer reducing the amount of new Soldiers required to fill the Army ranks.

The use of automated medical records and individual Soldier Health Advocate Avatars will allow increase the preventative medical capabilities of the AMEDD. Soldiers will be in constant knowledge through their avatar of what their medical status is. On site health physicals will no longer be required. Soldiers will receive instant updates on their health status, and diagnosis and treatments to any health irregularities will be started immediately.

Conclusion

The technology that will be available to the Army Medical Department in year 2039 will impact the personnel and the type of task that they perform. AMEDD personnel will average 10 years older by 2039. There will more personnel focused on researching and developing the newer technologies such as robotic surgery, nanomedicine, embryonic stem cells, genetic data and proteomic data. Medical practices such as manual surgery will become obsolete. Personnel will no longer need to attend long training courses, and will be better trained through the virtual world. Stem cell grown limbs will become the standard and replace artificial prosthetic limbs in amputee patients and change the practices in orthopedic surgery and physical therapy. Due to the advances in robotic surgery, nanomedicine, and telemedicine the AMEDD will have less of a need to deploy different medical specialist and more of a need for generally skilled medical professionals that are able to tap back into the institutional knowledge at the AMEDD centers around the world. And the AMEDD will require an all around highly educated workforce to support this highly technical organization.

The Army Medical Department in 2039 should be a high tech workforce and a world medical technology leader by 2039. The AMEDD today should create strategies to obtain the resources for researching and developing future technologies. Educational investments in AMEDD personnel should continue and increase in the future, ensuring that the personnel in the AMEDD are experts in their field. Partnering with civilian corporations in development of technologies and using off-the-shelf products can assist in maximizing the limited resource dollars the AMEDD has to spend. But by year 2039, the AMEDD should be viewed as the Microsoft in medical technology and medical practice.

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Non-Technological Factors and Forces Driving Training for Military Medicine in 2039 - LTC John Kent

While the future is certain to hold a host of technological advances requiring changes to how and what training the AMEDD will need to provide its members, there are also a significant number of non-technology related factors that will also require changes in the approach to training and maintaining a high functioning AMEDD. In one sense the challenges for the future will be complicated by the same challenges we face today, specifically the requirement to maintain both a deployable medical force and a high quality brick and mortar health care network. As such, impacts for the future will be described in two areas, Deployable Service (TOE Missions) and the Healthcare Enterprise TDA Missions.)

Globalization of Healthcare

Signposts:

Rates of enrollment in US Medical Schools; Public awareness of quality measures for foreign hospitals

For decades the students entering medical training in the United States had increasingly come from foreign countries and further trends included and increasing number of international medical graduates (IMGs) coming straight into the US health care workforce. But when globalization really began in healthcare, it mirrored the outsourcing of technical piecework that occurred in various industrial sectors such as the automotive and electronics industries. Nighthawk radiology services were commonly located in countries such as India where the advent of high speed internet services allowed these technicians to access digital exam results from all over the world and provide timely and accurate interpretations. But that was only the initial entry. On the heels of that trend came "healthcare tourism." First practiced as a cost saving measure for individuals with little or no insurance, this emerged as a common option in many insurance programs for the same reasons. The real revolution came once these practices (international outsourcing and medical tourism) became more commonplace and it became apparent that there were medical professionals trained all over the world who were capable of delivering high quality and safe patient care. What began with exporting of health care work , returned as a marked importing of international medical professionals to the United States.

Aging of the US Population

Signposts:

Movement toward health vice illness in healthcare debate coupled with development of financial incentives to maintain health

Throughout the first two decades of the 21st century the percentage of the US population that was over 65 years of age increased steadily. This aging of the "Baby Boomer" generation was clearly no surprise. Technological advances in health care provided early diagnostic recognition and enables medical and surgical responses that prolonged life particularly at the end of life. The truly terrifying and unfortunate side effect of this cohort's aging was that a large number of these people had a multitude of chronic diseases as a result of known poor health practices such as smoking and obesity as a result of poor dietary practices and a general lack or physical activity. The financial and opportunity cost of caring for this huge number of largely unnecessarily ill people created the groundswell necessary to develop incentives for personal responsibility in health. Maintaining one's physical health is viewed as having value both to allow them to work later in life and in an effort to improve the quality of life in later years of a person's life. Having long emphasized the importance of physical conditioning, the military was uniquely poised to capitalize on this opportunity and the AMEDD provides a leading role. This creates an opportunity to take force health protection to the next level. Maintaining personal health, beyond simple height weight and physical fitness standards, is directly tied to promotion potential and pay. The services all recognize the benefit of maintaining the human weapon system. Increased longevity of service reduces the number of Soldiers the Army needs to assess allowing more effort and attention to be placed on retention and training vice recruiting.

Physician and Healthcare Professional Disillusionment/ Dissatisfaction

Signposts:

Years of disjointed health care reform generated a significant amount of turbulence in many health care professions. Staffing shortages in nursing were exacerbated as the new entries into the job market were greeted by the ever increasing pressure to reduce overhead costs multiplied by the increasing complexity of health care delivery (both technical/clinical as well as regulatory/administrative.) Physicians were faced with geometric increases in complexity for payment systems which combined with a variety of compounding issues to make the practice of medicine significantly less about patient care and more about administrative activity. The result was a sort of health care workers revolt. Physicians, nurses, and countless other ancillary health care workers, feeling underpaid and over worked, fled primary care and small community health care settings in particular and headed for urban specialty care centers or left the field altogether. Some sought refuge in large urban practices and facilities where layers of colleagues and administrative personnel sheltered them from these forces. Others migrated to alternative health care settings outside the traditional payer systems into entrepreneurial ventures where pay was provided by patients directly based on services rendered. The military health service was not immune to the effects of this revolution. Providers and other health care staff in the MHS also revolted against the drive for MHS to reflect the civilian health care "industry." MHS leaders slowly realized that they had an ability to brand "Service" as an opportunity to transcend the demoralizing bureaucracy that health care had become. The resulting effort was a drive to balance the need for progress and efficiency with a fundamental requirement to instill in both military health care staff as well as patients, the feeling that providing health care in the military health system was an opportunity to serve the finest patients in the world while avoiding

Converging Cultural Demographics

Signposts:

Numerous trends and events have driven a dramatic change in where people live throughout the world. In general, the trend has sent an overwhelming majority of the world's population into huge sprawling urban areas. The mega-cities are a mixed blessing in the health care arena. On the positive side, in the United States and other developed countries, they allow for tremendous consolidation of health care capability into mega health centers which allow for advanced research and treatment and great economies of scale as well as integration of various health care providers within the national EHR. On the downside, mega-cities around the globe house substantial poverty leading to remarkable levels of crime and violence. Abroad this violence often results in levels of conflict that require military action to quell and on occasion create political instability and nation state failure. The close quarters also drive a host of public health concerns and problems that are experienced in proportion to the economic capability of the country in which they occur. The result is that violence and conflict is nearly continuous in underdeveloped, developing, or poverty stricken countries. The conflict is often directed by or at a particular ethnic, political, or religious party or group, but the common thread is poverty and lack of opportunity. In addition to these intentional causes of suffering, these mega-cities are increasingly vulnerable to natural disasters and infectious disease outbreaks. While these conditions should have driven governments and health agencies to develop mitigation strategies, this generally did not happen in underdeveloped and developing countries, further compounding the cyclical violence in those areas.

Impact on the AMEDD

- Must develop proactive and targeted recruiting of both quality International Medical Graduates and pre-med students from recognized programs world-wide and develop competency in international recruiting in order to compete in evolving health care human resource marketplace. Will also require markedly improved cultural competency on the back end to maintain the care, treatment, and support of these personnel and their families.

- Must develop bridging strategy to train and produce critically short health care professions (including nurses.)

- Become industry leader delivery of evidence based care targeting health longevity care. Outcome is not simply longer life, but longer high quality life with reduced health problems at the end of life as measured by an elderly beneficiary population with significantly lower morbidity and health care utilization rates as measured by imbedded metrics within the EHR system. Must develop dedicated health care roles for true health maintenance which leverage the entire scope of proven wellness and fitness associated practices. (With technology this may even become a human resources function vice health care, potential signposts: emphasis on PT, suicide prevention, etc.)

- Must develop strategies to utilize older staff while maintaining structure for upward mobility for traditional service members
    - Example: Develop process to transition uniformed staff to non-uniformed staff role after set minimum period of honorable service in order to allow them to continue to serve but not count against deploying end strength (Senior Mentor Role.)
- Longer periods of service allow Soldiers to develop a significantly extended depth of training and experience, critically important as the technological complexity of equipment require longer time periods to learn proficiency.
- Development of professional communities (clinical and administrative) within the work force integrating civilian and military personnel into a cohesive community. Sense of what effects one effects all in a profession and across all professions within the AMEDD.

The Deployable Service

- Must develop a capability and expertise to operate in an urban but austere environment to deliver a range of mission capabilities ranging from domestic support and disaster response to the full range of conflict support for military operations abroad.
- Must improve cultural competence and knowledge supporting both the military care and the deployed mission in areas around the world through integration of staff from around the world. This will also support improved competence in regional medical concerns and credibility in delivery of international medicine supporting contingency operations and health care relief missions through integration of staff from around the world
- Must embed deploying teams into the TDA structure above and beyond TDA capacity requirements allowing maximum training value (practice) with reduced impact on care when deployed. PROFIS is broken; it breaks the MTF and is a suboptimal training venue for deploying providers (fails to provide adequate time for meaningful deployment platform and other readiness training.)
- Must develop a robust disease surveillance and public health intervention capability, particularly to deal with infectious disease and industrial illnesses found in urban centers.

The Healthcare Enterprise

- Create systematic process for delivering and measuring the effectiveness of wellness related health care delivery. Focus will be on outcome of care not process of delivery (i.e. reduction in incidence of illness or injury vice provision of some service.)
    - Staffing

- Programs and metrics
- Personal monitoring products (for patients)

- Develop and deploy a comprehensive Electronic Health Record (EHR) that synchronizes with personal health monitoring products and tracks, trends, and reports on health status (issues/changes, utilization, effectiveness of interventions, etc.) and alerts the health care team or patient as appropriate on necessary interventions to maintain health. Full implementation of EHR tools across the spectrum of the enterprise must also minimize requirement for clinical staff administrative effort.

Appendix 6: Geo-Politics (VWG 6) Individual Papers

Geopolitical Climate in 2039 – COL Dana Scott

The following are projected to be key geographical/environmental concerns shaping global politics by the year 2039.

1. Post World-War II institutions no longer function (United Nations, World Bank, NATO, etc) and are replaced by international business/corporations. As private capital dwarfs state programs there will be a shift in power; meaning that our future battlefield partners in shaping "hearts and minds" with military medicine may be corporations versus State governments.

IMPLICATION: Change in military medicine logistics and partnerships

2. Food Scarcity will drive future conflicts and will dictate the location of future military operations. In the past food has been available but unevenly distributed. By 2039 environmental and population changes will result in actual food shortages especially in Asia and Africa.

Food shortages will occur predominantly because of loss of arable land to desertification, increasing global temperature, insufficient fresh water supplies for irrigation, and extinction or local loss of animals and insects that pollinate vegetables and fruits.

IMPLICATIONS: Malnutrition and food borne illness should be expected to increase; the most effective medical countermeasures will be preventive in nature.

3. Potable water availability will continue to decline for much of the developing world. In fact, water will be the "oil" of the 21st century and lack of availability to water will be responsible for civil unrest and international conflict. Water sources will continue to deteriorate and populations will be forced to use polluted and contaminated water for consumption.

IMPLICATIONS: Water borne illness will continue to increase; the most effective countermeasures will be preventive in nature.

4. The world's population will continue to grow and will be predominantly found in urban areas. State governments will be unable to keep pace with growth in cities and critical infrastructure will not be available in most municipalities. Crowding, lack of sanitation and medical infrastructure will allow large scale epidemics/endemics; in fact, the leading cause of death will be epidemic disease. Additionally, a gender imbalance produced by the abortion of female embryos in cultures that have a male child preference will induce significant violence and further disrupt delivery of services in urban areas.

IMPLICATIONS: Sanitation, vaccination and other preventive medical countermeasures will be the most successful interventions.

5. Bioviolence should be expected to increase and biotechnology becomes mainstream and affordable. Integration of biology and nanotechnology will also produce biological weapons that will be difficult to counter.

IMPLICATIONS: Again, preventive medical countermeasures and accurate, rapid diagnostics will be key to impacting health issues associated with new biological threats.

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What Will Military Medicine Look Like In 2039? – MAJ Chad Dawson

Military medicine will share many of the advances of medicine as a whole having led the way with many of those advances, but will also have the additional obligation to seek to protect the population against potential bio-threats such as germ warfare. Military medicine will take an active role in the discussion regarding genetic engineering which left unchecked has the potential to change life as we know it. Military medicine will prove an essential role in geo-political aims as mindsets and loyalties of other nations will have shifted to seek the favor of the AMEDD/DMEDD.

Forecasts for Military Medicine In 2039

Digital Technology and the Health Care Industry

In the year 2039, AMEDD will find itself in the role of health care consultant to others in the health care industry as we share the successes experienced over the past two decades. By 2019 the database established by AMEDD to assess treatment modalities against healing has given us a true evidence-based practice. This has yielded total transparency on costs and results of care. Partnerships with NGO's and various non-profit organizations have funded the expansion of our learning environment to outlying populations as we collect data on successful treatment of diseases endemic to those regions. Biosensors give accurate feedback to log the effects of all components of health including sleep, diet, herbal supplements, exercise, hygiene, and individualized treatment interventions. By having a truly evidence-based practice, costs decrease, inpatient stays are fewer and of shorter duration, antibiotics are used accurately so as to not yield resistant strains, pain is minimized, and health and quality of life are maximized.

"Give and Take" with Allied Nations/ Organizations

By 2039, the AMEDD is the proven leader in seeking to provide the highest quality of care to beneficiaries. By establishing an understanding of where the best knowledge exists, best treatment options exist, best access to care exists, and the AMEDD has established "give and take" partnerships. Rather than "reinventing the wheel," AMEDD officers are afforded opportunities to train in hospitals, labs and clinics of allied nations where these successful practices already exist. These successes are then implemented into the way the AMEDD practices. By training health care providers of allied nations in our own GDE programs, hospitals, labs and clinics, the AMEDD benefits in countless ways. Immediate benefit is sensed by our retiree population as an increase in providers permits increased access to care. Retention of soldiers is increased in turn as service members seek to qualify for this high-quality, life-long care. An increase in retention of AMEDD officers is also obvious as they are attracted to the opportunities for travel, and education.

Genetic Engineering

Advances in stem cell research made possible by changes in U.S. law during the Obama administration further sped the genetic revolution. By 2019, the U.S. was faced with significant moral questions and shifting values as people ask profound questions about the meaning of life, and our purpose on earth. These value shifts had a deep and transforming effect on the way that all health care is conducted. Gene targeting of cancer cells give the ability to predict, prevent, and destroy cancer cells as well as repair tissue damage. By 2039 genetic engineering has provided the means for a cure of diabetes as well as yielding new vaccines for malaria, HIV and more. Similar to blood banks of today, in the year 2039 we can anticipate tissue banks for replacement organs and tissues made possible through stem cells and cloning. Genetic engineering has significant utility for positive changes and developments, but in the hands of the enemy also has the potential for an increased potency and likeliness of a bio-threat.

Germ Warfare and Defeating Bio-Threats

Germ warfare has long been a threat to the U.S. and its allies, but the threat will also have evolved to be more potent and perhaps more realistic. As the threat is deemed to be in fact realistic, the government will look to the AMEDD for answers on how to best protect the population from such a risk.

It is important to note that all of the classical and modern biological weapons organisms are animal diseases, the only exception being smallpox. Thus, in any use of biological weapons, it is highly likely that animals will become ill either simultaneously with, or perhaps earlier than humans. Indeed, in the largest biological weapons "accident" known -- the anthrax outbreak in Sverdlovsk (now Yekaterinburg) in the Soviet Union in 1979, sheep became ill with anthrax as far as 200 kilometers from the release point of the organism from a military facility in the southeastern portion of the city (known as Compound 15 and still off limits to visitors today).

Thus, a robust surveillance system involving human clinicians and veterinarians may identify a bioweapons attack early in the course of an epidemic, permitting the prophylaxis of disease in the vast majority of people (and/or animals) exposed but not yet ill. For example in the case of anthrax, it is likely that by 24 - 36 hours after an attack, some small percentage of individuals will become ill with classical symptoms and signs. By making this data available to local public health officials in real time, most models of anthrax epidemics indicate that more than 80% of an exposed population can receive antibiotic treatment before becoming symptomatic, and thus avoid the high mortality of the disease.

By 2039, surveillance systems for germ warfare will consist of biosensors imbedded in individuals, integrated sensors at food and water processing plants, as well as air quality sensors made available to "at-risk" communities by 2029 and ultimately to all communities in 2039.

Changing Hearts and Minds

Cultures once opposed to the U.S. are seeking her favor in the year 2039 as the AMEDD has proven able to aid and heal. As the AMEDD has shown a willingness to train health care providers of allied nations, the populations of those nations also experience an increase in health and overall quality of life. As a loved one is healed, human emotions of gratitude are evoked toward the healer. As the AMEDD provides that role of healer to other populations, those populations in turn have a sense of indebtedness toward the AMEDD and the U.S. which proves to be a critical component of the AMEDD's role in geo-political aims.

"Battlefield Medicine"

In the current OIF/OEF conflicts, our reported battlefield injuries total 31,193 over the past 6 years with 55% of those soldiers as return to duty. By 2039 that number will be 95% as the AMEDD has implemented many new strategies for battlefield care. The

Recommendations for AMEDD

Working…

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What will medicine look like in 2039? – MAJ Cindy Renaker

The future of Medicine will focus on utilizing advanced technologies to identify, prevent, treat and manage diseases. Nanotechnology will become the treatment modality of choice for such diseases as cancer, diabetes, bacterial infections and as a tool to lengthen the human lifespan. Virtual medicine will become a preferred choice for delivery of care, bringing the physician to the patient within a work, mobile or home environment. Implantable microchip devices will be developed that can transmit an individual's biological information to remote experts for immediate interpretation and treatment recommendations. The consumer will be held accountable for taking charge of their own health. Through insurance incentives, private and employee health plans will monetarily reward employees for healthy life styles while penalizing employees for poor lifestyle choices. As the world become healthier, the average life expectancy rate climbs to 90 years.

Implications: The AMEDD has the opportunity to lead the way in research and application of nanotechnology and technology based medicine.

Implications: The military already penalizes Soldiers for not maintaining weight and physical fitness. To go a step further, why not promote wellness by providing innovative incentives (money, extra days of leave, etc.) for Soldiers that maintain healthy lifestyles.

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How Could Medicine Influence Geopolitical Environment Of 2039? – COL Corinne Ritter

In 2039 Military medicine is part of the U.S. National Strategy promoting economic growth in emerging small economies. As the US National Strategy continues to influence the geo political map of the World and the economies of those emerging democracies are in need of viable markets Military medicine will continue to provide a positive investment in these emerging economies. The Army Medical Departments contact and cross training programs are constructive investments that through Military to Military contact will assist the country in building a Military Medical Force that will have direct impact on partnerships with an emerging health care industry; educational institutions and human capital. One practical method to engage these small armies is when many countries cannot afford a large full time medical department is through the Army Reserve Medical Department which can engage in building Reserve Structure in these poor countries. It is through partnerships with industry and their Reserves components that these highly skilled citizen Soldier will be embedded in the communities. This investment in human capital will establish a base in which a health care industry can grow. Poor economies that were dependent on providing health care to their citizen are now given skills through military medicine to build a health care industry.